North Carolina Highway Bulletin

VOL. IV FEBRUARY, 1924 No. 12

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NORTH CAROLINA
HIGHWAY BULLETIN

VOL. IV, NO. 12 **H. K. WITHERSPOON, Editor** **February, 1924**

North Carolina's Highway System

A Notable Achievement of the Greatest Importance To Be Appreciated and Emulated

Impressions of the Extraordinarily Successful Creation and Development of the Most Vital Public Utility With Unprecidented Rapidity, Efficiency and Immediate Beneficence Coördinated With Enormous National Future Extension.

By Frank W. Skinner, *Consulting Engineer.*

THE wide area, diversified beauties and immense resources of North Carolina, its bountiful products, important manufactures and wide commerce, its gracious hospitality and the charm of its beautiful capitol, expanding cities and delightful towns are among the vivid impressions that linger with one privileged to visit this commonwealth.

These and other elements are integral with the great highway system skillfully planned and rapidly developing in an incalculably great factor for prosperity and pleasure that creates and multiplies wealth far beyond the millions of dollars so generously appropriated and wisely expended to establish and improve it.

Familiarity with traffic conditions and organizations in nearby states gained by studying, inspecting and describing their practical features and operations give this writer respect for the magnitude and difficulty of the highway problem in North Carolina.

The privileges of even a rapid visit to the various departments at headquarters with explanations of their coördinated functions, the evidences of technical efficiency, visits to important construction and the inspection of many miles of roads of various classes, all confirm his high opinion of the character, intrinsic value and the remarkable extent and perfection of system, detail, organization, construction equipment and maintenance that have been achieved in an incredibly short time and already insure remarkable present and future results of enormous value and significance, with exceptional economy attained and maintained.

Since 1920; since yester-morn, as great public policies are counted; all the great and small highways that network the 48,740 square miles of this state and serve its two and a half million citizens have been transformed. Previously they were independent local routes, often casual and even sometimes conflictory and wholly without uniformity of character, construction, quality, type or maintenance. Now they have become a single concrete uniform system under experienced management harmonizing all to the greatest public good, adopting them to local and general requirements, insuring uniformity, excellence, rapid improvements and extensions. They are safeguarded by wise and efficient expenditures that will make each year show large profits in productions, transportation, commerce, pleasure, comfort and general prosperity.

Under the direction of the earnest and able commission and the complete and well balanced designing, constructing and maintaining organization resulting from the long proved skill of the experienced chief engineer, a systematic plan of improvements and efficient maintenance has been created almost over night. Well established types of roads have been adopted or improved and new types have been developed to suit local conditions and most efficiently utilize available resources. Bridges, culverts and general construction have been standardized to the great benefit of rapid, economical and durable results.

Extensions have been conducted and maintenance perfected and assured to conserve the costs of building and yield the highest benefits of vastly increased traffic. Future improvements have been rationally planned to permit hundreds of millions of dollars of increased commerce and production. All this utilizes the lessons, experience and results of the most successful highway improvements and methods and the ablest highway engineers throughout the United States who have spent vast sums and labored for years to slowly achieve the progress that North Carolina has grasped, readymade, and adopted to her comfort and prosperity.

A central administration organization has been established with departments for law, finance, accounting, records, publication, design, surveys, construction, maintenance, inspection and equipment. Laboratories have been equipped with complete apparatus for thorough physical and chemical tests and investigations of materials. A splendid machine shop and headquarters for the conservation and improvement of a vast amount of machinery and apparatus including about 1,000 motor vehicles valued at more than three and a half million dollars, has been established to provide for the property of the department.

These facilities are concentrated in Raleigh for the most efficient construction improvement and maintenance of more than 6,200 miles of various types of highways in the nine districts into which the state is divided.

A corps of about 800 employees has been trained in the engineers and executive departments, which, with others increase the total force to 2,000.

By the end of next year improvements totalling $65,000,000 will have been completed or authorized and the maintenance of finished roads at a cost increasing with added mileage and decreasing with improved construction, will be entirely provided by the revenues from gasoline sales amounting to $7,000,000 or more annually. These be achievements worthy of the State, of the loyal hand picked personnel of its Highway Commissioners, and of the high appreciation of citizens and visitors.

Among the interesting projects noted in my recent visit was the 15 mile Nashville-Springhope section of project 163 which has just been paved with about 140,000 square yards of concrete at a cost of about $400,000. That this high quality work was accomplished in the record time of 8 months was due to the timeliness, reliability and promptness of the engineering operations which always provided all information, instructions and inspection in readiness so that no delays or mistakes were occasioned; to the excellent detour facilities that avoided traffic interruption, left construction unimpeded and assured the public of continuous good roads; and to the coördination and hearty coöperation of the engineering forces with the contractor who developed high speed and efficiency with an ample and well trained organization, abundant mechanical equipment and systematic forethought in provision and distribution of more than 60,000 tons of materials that were always on hand to keep the men and machinery busy.

The work was divided into three independent sections each supplied from a central receiving and storage station, equipped with up-to-date apparatus for loading and measuring the aggregate that was distributed constantly by a fleet of motor trucks and by 8 locomotives hauling industrial trains to the high power caterpillar traction paving machines that worked up to the limit of speed for thorough mixing and attained a theoretically super-maximum progress sometimes exceeding 700 lineal feet daily.

The $417,000 Tarboro-Bethel contract for 12 miles of concrete pavement on projects 126 and 187, Route 90, is now under construction by the same contractor, the Public Service Production Company, and will require more than 50,000 tons of cement and aggregate. This road will also be built with industrial track distribution of materials which will all be stored at one central station. A large part of the road is entirely new, so ably located that there are only 300 feet of the maximum 3% grade and none others of more than about ½%, no superelevated curves and only three long-radius curves. Besides 13,000 yards of road excavation and 8,000 yards of ditch excavation there are 62,000 yards of borrow, most of which will be made by the boulevard method of side excavation and scraper work that practically eliminates overhaul.

Such large scale advanced utility works, typical of what are progressing through the nine districts of this State are a source of pride and profit to the citizenry, a monumental credit to the vision, financial and constructive administration of the Highway Commission, and an inspiration and joy to engineers and contractors who should emulate such methods.

"The Shirt Sleeve" Road Show

ONE of the most, if not the most, unique road shows in the history of road building will be staged in North Carolina during the first week in June when a large gathering of road builders will be shown the actual operation of building North Carolina roads.

The plan is the idea of Frank Page, Chairman of the State Highway Commission and past President of the American Road Builders Association under whose aupices the show it to be given. Working closely with the Association the State Highway Commission will assist in making the show an assured success. Members of both bodies have given their hearty approval to the scheme and plans are being worked out which will insure an event equal, in a different way, to the Chicago Road Show. At the latter show the last word in road building equipment was exhibited and at the North Carolina Road Show much of this same machinery will be shown in actual operation.

Construction projects will be chosen, located as nearly as possible in the center of the State, illustrating the different types of construction and on these jobs equipment manufacturers will place the most modern equipment designed for the construction of that particular type of road. For example, on a concrete project the latest type of forms, mixers, industrial railway, finishing machine, and other items will be used. An expert in the construction of each type of road will be on the job to explain in detail the various steps. Ample assurance has been received from various equipment manufacturers that everything of this nature will be available.

Chief among the visitors during the road show will be a party of fifty or seventy-five representatives from South American countries who are coming to the United States to study road conditions. It was originally planned to extend official invitations only to highway officials of surrounding states and a few other promient highway builders but the idea of the show has been so enthusiastically received throughout the country that it is difficult to estimate the number that will probably attend.

While the visitors will probably travel over a large part of the State during their stay headquarters will likely be made in Greensboro, High Point, Winston-Salem due to the fact that the three cities are centrally located and connected by paved roads thus giving the advantage of the hotels in all three towns.

One of the features of the show will be one of the largest road lettings ever held in the history of the commission. This will be held during the show so as to given the visitors an idea how the work is let to contract. The letting will also serve to bring a large number of road contractors to the show and afford them an opportunity of observing modern road construction.

The road show will be of immense value to the State as a whole, from an advertising standpoint. Besides being shown how North Carolina is building her wonderful system of roads the visitors will be taken on numerous side trips to the more important manufacturing plants and other points of interest throughout the state. These trips, however, are dependent on the amount of time that can be spent in the State.

While the details of the plan have not been perfected all indications point to a highly successful event, and one which will go down in the annals of highway work.

THE HIGHWAY OF THE STARS

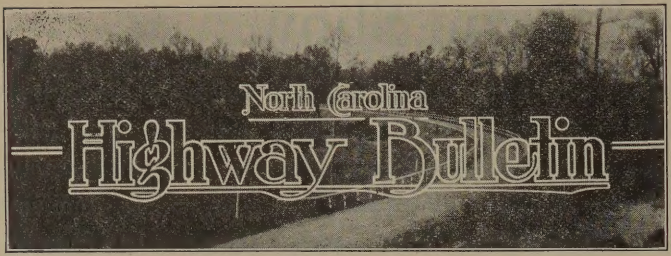
Ambition is life's greatest highway that points to the stars—it is lighted by the rays of hope that spring from the heart of man and paved with beads of sweat that fall from his brow. Few of us are fortunate enough to reach the heights for which we strive, but we gain all we get from the strain and sweat—and the struggle is always worth while.

For the accommodation of the masses, a good highway is probably of more importance than a railroad. This is at least true as regards passenger traffic, for a good highway paralleling a railroad carries from five to ten times as many people as the railroad.

Give us good roads or give us social isolation, economic paralysis, and intellectual stagnation.

Twelve thousand consolidated schools in the United States testify to the educational value of the highway.

Personal liberty does not mean that you can appropriate the highway irrespective of the rights of the coming vehicle. Your personal liberty ends where the other half of the highway begins.—*Texas Highway Bulletin.*



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Address all communications in regard to BULLETIN to the Editor, Box 1140, Raleigh, N. C.

This BULLETIN will be sent gratis to any State or county official, contractor, newspaper, trade publication, library, or other person interested in the improvement of roads and in the work of the Commission. Advertising rates may be obtained on application.

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Editorial

Photographs of the "Floating Road" have been taken from several different angles but the one on the cover sheet is probably the first that was ever taken from the air. In the center of the right hand side of the picture may be seen the Elizabeth City end of the road together with the draw bridge. The construction of this road was of more than usual interest on account of the swampy nature of the soil on which it was laid, it being necessary to lay corduroy under the fill.

⚜

Contractors who did not land a job at the letting on January 31st will have another chance on March 20th, which has been tentatively set for the next letting.

⚜

The specifications for 1924 contain a number of changes which have been made after careful and thorough study. In order that resident engineers, contractors, and others interested may become thoroughly acquainted with the new specifications a resumé of the changes is published in this issue. Additional copies of this may be secured by addressing the Editor.

⚜

The Chicago Road Show was a success from every standpoint and it is indeed gratifying to know that two members of the State Highway Commission played a prominent part in putting it across. The Chairman of the Commission, Frank Page, was President of the American Road Builders Association and Chas. M. Upham, State Highway Engineer, was Convention Manager. With these officials behind the "shirt sleeve road show" which is to be held in North Carolina in June its success is assured.

⚜

Unless a State Highway System be laid out and built so as to serve the public it has failed in its purpose. In an article on page 8 Mr. Upham discusses very clearly some of the requirements for a serviceable highway system.

Contracts Let January 31

THE first letting of the year, held January 31, resulted in the awarding of fourteen projects out of nineteen advertised for bids. Fifty miles of the work let was for hard surfacing while twenty-nine miles was for grading and topsoil surfacing. Bids on two projects advertised from the First District were rejected, as was the bridge over the Yadkin river between Wadesboro and Rockingham. Bids for one entire project and the roadway on another in the Seventh District were also rejected.

The results of the letting are as follows:

Second District

Project No. 222, Duplin County, consisting of 10 miles on route 40 between the Pender County line and Kenansville was awarded to the Highway Engineering and Contracting Co., of Selbyville, Del., for grading and sand asphalt surfacing while the structures on the same project were awarded to the Hobbs-Peabody Construction Co., of Charlotte. The total cost of the work is estimated to be $291,000.

Third District

After being advertised several times unsuccessfully, Project No. 352, New Hanover-Brunswick counties has been awarded to the Highway Engineering and Contracting Co., of Selbyville, Del. The work consists of surfacing the Wilmington Causeway, 2.31 miles in length. Waterbound macadam will be laid at an approximate cost of $83,000.

The above contractors were also awarded Project No. 381, Pender county, 11.99 miles on route 40 between Burgaw and the Duplin county line. This project connects with Project No. 222 and will likewise be surfaced with sand asphalt at an approximate cost of $264,300.

Fourth District

Austin and Ritchie, of High Point were awarded the grading on Project No. 449-A, Lee county, consisting of 2.51 miles on route 53, from the Chatham county line to the intersection of the route with route 50. The contract for the structures was awarded to C. D. Riggsbee, Durham, N. C. The entire project will cost in round figures $29,000.

Project No. 472-B, Vance county, located on route 57 between Henderson and Oxford was awarded to C. A. Ragland, of Louisburg, N. C., for grading and topsoil surfacing while the structures were bid in by Rhyne and Kitchen, of Blacksburg, S. C., the total cost of the work being approximately $85,000.

Fifth District

Only one project was advertised in this district, No. 536, Guilford county, extending from the Rockingham county line towards Greensboro, a distance of 6.15 miles. This contract was awarded to the Hagedorn Construction Company, Greensboro, N. C., for grading and concrete paving. The work will cost approximately $189,000.

Sixth District

The roadwork on Project No. 662-A, Richmond county, 6.2 miles on route 20, from the Anson county line to Rockingham, was awarded to T. M. Chandler, of Virgilina, Va., and the structures to the Yadkin Construction Co., of Albemarle, N. C., the total cost being $72,700.

Seventh District

Structures on Project No. 720-A, Caldwell county, were awarded to the Berry-Fortune Construction Co., of Hickory, N. C., for $39,000.

Bids on roadway were rejected.

Hardaway Contracting Company, of Charlotte, were awarded the paving on Project No. 732-B, Davie county, 8.07 miles between Mocksville and the Forsyth county line. Type "F" concrete pavement will be laid at an approximate cost of $311,000.

Eighth District

J. M. Gregory & Co., of Pittsboro, were low bidders on Project No. 836-B. Henderson county, from Henderson to the Buncombe county line. The 9.51 miles included will cost approximately $308,000.

Ninth District

The roadway contract on Project No. 912-A, Cherokee county, was awarded to the Wilson Construction Company, of Rutherfordton, for $89,000, this covering the grading of 8.62 miles of route 10 between Andrews and Murphy.

W. T. Moore, of Andrews, N. C., was awarded Project No. 912-B, consisting of 8.35 miles of route 10 between Andrews and Murphy, for $36,000. This including the grading only.

Project No. 990-A, Transylvania county, an extension of 0.47 miles to Project 990, between Brevard and Rosman, was let to the Piedmont Construction Co., of Asheville. Waterbound macadam will be laid at an approximate cost of $13,250.

Grading on Project No. 992, Transylvania county, will be done by W. H. Anderson, of Spruce Pine, and the drainage structures built by R. C. Stevens of Asheville for approximately $67,800.

The Development *of a* State Highway System

Roads Must Be Built to Serve Public Every Day in the Year

By CHARLES M. UPHAM, *State Highway Engineer of North Carolina*

THE development of a state highway system may be measured by the extent that it affects the economical, civil and social life of the individuals of a state. The standard of living of the individuals depends on the modes and development of transportation and the transportation depends on the road service that is furnished to the public by the highway commission.

The development of a state highway system does not necessarily mean only the construction of hard surface roads, for it has been plainly demonstrated where the road program has been carried on in this manner that the value of the state highway system has been reduced. The State as a whole has not been served.

The development of a state highway system *does* mean road service to the public 365 days in the year and this road service may be brought about by the construction and maintenance of the highest types of hard surface roads, or it may be in merely the grading of some earth road; it might possibly be in the construction of the highest type of bridge, or it may be in the construction of a rough timber bridge.

Whatever may constitute the road service, it should be conducted on an economical basis, taking into consideration the cost of the improvement and the returns received on the investment; the reduction in the cost of hauling and the increase in the amount of hauling; the time element that is saved; the added value to property and all other increments that follow in communities where road service in the form of good roads has brought about progressive development.

In certain localities of this country the industries and commerce have developed with rapid strides. In most cases the early roads which were constructed in these localities were utterly broken down when automobile trucks began to be such a factor in transportation.

Of course, it is quite evident that in order to furnish road service in these localities that hard surface construction must immediately take place. This construction must be based on the highest standards as determined by research and investigation. There are, however, vast localities, many times greater than these developed areas, that have not as yet reached the state of progress that demands or can afford, hard-surfaced roads. The problem of furnishing to these undeveloped localities the road service, which should be the aim of all state highway systems, is more of a complicated problem than merely the construction of hard surface roads.

The problem of developing a state highway system, or of furnishing road service to communities, is very different in different States; varying in accordance with the state of development and natural resources of the particular locality considered.

I think it is safe to state that nearly as much money has been wasted in the construction of road types that are stronger than necessary, as the amount of money that has been wasted in the construction of roads that were not strong enough to meet traffic requirements. In other words, there are numerous examples where States have spent $40,000 per mile in roadway construction, where an $8,000 per mile roadway would have sufficed for many years. The same expenditure made for the higher type road per mile would have constructed 5 miles of satisfactory road and furnished five times the amount of road service to the public and provided for a state development in five times as many places.

The problem of any transportation system is correctly answered in proportion to the amount of service that it renders the public, and the progress and prosperity of the communities of the State is in direct proportion to transportation service rendered the community. The development of any locality or State comprises many problems and practically every one of the problems contain the variable factor of transportation. In the construction of large buildings, or the building of roads, or in the every-day life of all professions, the problem of transportation is one of the most important governing factors. One of the reasons why the early development of this country was difficult was because of the lack of transportation facilities. The only means of transportation available at that time were the water fronts, rivers and lakes. As the country developed, community roads were constructed, later these were pushed forward into the country and the immediate localities developed. As the localities developed the roads pushed further on and these localities were connected and the broader road system brought about general development.

About 1830, railroads began to be constructed and with this transportation service there followed an extensive development of the States and entire country. With this means of transportation the country enjoyed an extensive development and progressed rapidly. The construction of railroads reached its peak about 1885 and it may be said that this extensive development of the country was approached at that time. Since that time the intensive development of the States has taken place and this has been brought about and expedited by the new means of auto transportation.

(*To be concluded in the April issue*)

Changes in 1924 Road Specifications

Notice to Contractors

2d Paragraph: The clause—"On Federal Aid Construction monthly payments will be made on eighty-five (85) per cent of the work performed," has been struck out.

Disqualification of Bidders

3. Failure to Carry out Contracts: No proposal will be considered from a bidder who has failed to carry out previous contracts, and to perform the same satisfactorily to the State Highway Commission, and no bidder shall be considered responsible who has failed to carry out any contract in which the State of North Carolina has been directly or indirectly concerned.

Award and Execution of Contract

3. Separate Contract for Structures: In the event that separate contracts are let for grading or paving and for structures, the structure Contractor shall be required to so conduct his work that he will interfere as little as possible with, or hinder in any way, the progress or the completion of the work of the road Contractor. In the event that the structure and roadway contracts are let separately it is understood that this fact is accepted as a condition existing to each contract, and that the roadway Contractor has included in the price bid in the unit items the extra expense for the necessary interference occasioned by the structure Contractor. This is to include such details as the necessary construction of detours around structures used for the purpose of hauling roadway materials; the removing of plant equipment or materials to fill in gaps that may have necessarily been left due to non-completion of structure, and other similar details. The roadway Contractor shall so conduct his work that the structure Contractor shall have access to his work at all times.

General Provisions

7. Plans: All drawings furnished by Contractor shall be made on tracing cloth with black waterproof ink.

15. Character of Workmen and Equipment: The words (or labor) inserted in last sentence, 1st paragraph, to read: "Failure by the Contractor to provide adequate equipment or labor may result in the annulment of the contract as hereinafter provided."

The 3d Paragraph under 15 has been inserted as follows: "The Contractor shall furnish, and replace as becomes necessary, all the finishing tools and implements as shown on the sheet of standards."

20. Barricades, Danger and Detour Signs: The word "Illuminated" inserted in 1st sentence.

28. Temporary Crossings: The Contractor will be required to build and maintain temporary crossings with their approaches at his own expense when so required by the Engineer.

47. Maintenance: The Contractor shall maintain the project in first-class condition for thirty (30) days after it is completed in case of top-soil, sand clay, gravel, shale types and water bound macadam. For all other types fourteen (14) days maintenance is required. Minor work, such as building up head walls, cleaning out of pipe culverts, drainage ditches and dressing up of shoulders may be included in this maintenance period. During this time Contractor will take care of washouts and make final dressing up. Ten per cent of the final estimate will be retained by the State Highway Commission to enforce this requirement, except that the Engineer may, in his discretion, release the Contractor from the further maintenance of sections of the project, not less than two miles in length, which have been satisfactorily maintained under traffic the required time, unless otherwise provided in "Special Provisions."

Clearing

4. Clearing: Clearing shall be done for a width at least five (5) feet outside the construction line on all hard surfaced projects, at least ten (10) feet on all top soil projects, except on the inside of all curves, in which cases the clearing shall be extended according to the degree of the curvature, as directed by the Engineer in writing, to insure unobstructed vision.

Drainage Ditches

1. The Contractor will be required to excavate the drainage ditches before the pavement is laid and in general at the time the rough grading is done.

Common Excavation

6. Roadway Excavation: Drainage and side ditches shall always be excavated for not less than Four Thousand (4,000) feet ahead of roadway surfacing.

10. Embankment: When the ring or grooved roller is used the layers of material shall be not more than six (6) inches thick. Stone columns shall be brought up from weep holes as provided in Bridge Specifications under "Backfilling."

13. Subgrades: Weight of rollers changed to 4 to 10 tons and minimum weight not less than 170 pounds per inch width of tread.

21. Shoulders: Paragraph 22: Curing days reduced to 14 from 21 days.

Borrow

1. Borrow, Paragraph 1: (From the roadway excavation) substituted for, within the right-of-way.

Overhaul on Surfacing

1. The following has been inserted: In cases where the borrow pit is located away from the highway and when material from said pit is hauled both ways from the intersection point of the center line of the highway with the shortest practical route over which it is hauled from the pit, then and in that event the overhaul shall be computed, as having two centers of gravity—one on each side of the intersection point.

Broken Stone Base Course

1. Addition of "When the typical cross-section calls for compacted thickness of more than four (4) inches it shall be constructed in two layers of equal thickness as described under waterbound macadam, Class B, Item 16-B."

5. Spreading Coarse Stone: Addition of "The Contractor will be required to use such tools as are shown on sheet of standards when so ordered by the Engineers."

10. Basis of Payment: This work will be paid for as Broken Stone Base Course. Coarse stone and screenings complete in place will each be paid for at the contract unit price per ton: Which prices will include all rolling, material, temporary forms, if any, equipment, tools, labor, and work incidental thereto. When aggregate is produced at local quarries, satisfactory scales or suitable weighing apparatus must be installed at the Contractor's expense, but when stone is imported railroad weights may be used. The State Highway Engineer, however, may require the Contractor at the Contractor's expense to install satisfactory scales or weighing apparatus if occasion demands. The State Highway Engineer reserves the right to check weights of aggregates at any time.

Reconstructed Base Course

3. (a) Construction Methods. Where the existing surface consists of broken stone or other similar materials, it shall be scarified to such uniform depth and width as may be prescribed by the Engineer and sufficient to eliminate all depressions and irregularities and to permit of uniform reshaping. After loosening, the material shall be spread and shaped to conform to the cross-section of new paving and rolled with three (3) wheel power roller weighing not less than ten (10) tons. Stone, or slag, sufficient to bring this surface to the grade indicated on the plans shall be added, and compacted by rolling and application of screenings, and water, as specified for "Broken Stone Base Course."

4. Basis of Payment: Manipulation will be paid for at the contract unit price per square yard for width of new paving, and shall include all scarifying, shaping, rolling, equipment, approved tools, labor, rescarifying, rerolling, if necessary, and all work incidental thereto.

Added materials consisting of coarse stone and screenings complete in place will each be paid for at the contract unit price per ton. When aggregate is produced at local quarries, satisfactory scales or suitable weighing apparatus must be installed at the Contractor's expense, but when stone is imported railroad weights may be used. The State Highway Engineer, however, may require the Contractor at the Contractor's expense to install satisfactory scales or weighing apparatus if occasion demands. The State Highway Engineer reserves the right to check weights of aggregates at any time.

Waterbound Macadam, Class A.

1. General Description: (d) The Contractor shall be required to use such tools as are shown on sheet of standards when so ordered by the Engineer.

2. Coarse Stone: When local stone is used a higher percentage of wear may be allowed when stated in Special Provisions, or approved in writing by the State Highway Engineer.

9. Basis of Payment: This work will be paid for as waterbound macadam "Class A." Coarse stone and screenings, which include Base and Surface Courses complete in place, will each be paid for at the contract unit price per ton: Which price will include all rolling, material, temporary forms, if any, equipment, tools, labor, and work incidental thereto. When aggregate is produced at local quarries, satisfactory scales or suitable weighing apparatus must be installed, at the Contractor's expense, but when stone is imported railroad weights may be used. The State Highway Engineer, however, may require the Contractor at the Contractor's expense to install satisfactory scales or weighing apartus if occasion demands. The State Highway Engineer reserves the right to check weights of aggregates at any time.

ITEM 16-B

Waterbound Macadam, Class-B

This is a new item, calling for Base and Surface Course, each of equal thickness. For details see Item 16-B, pages 54, 55 and 56.

One-Course Portland Cement Concrete Pavement, Type E

Changes in Specifications on this type of pavement are numerous, the principal ones are inserts as follows: Fine aggregate not passing the above specifications may, at the option of the Engineer, be tested by a comparison with Standard Ottawa Sand when made into concrete by the methods standarized at the Concrete Laboratory of the Division of Tests. In case this method is used the laboratory standard cement and coarse aggregate will be used making up the concrete for comparison. Screenings may be used when so specified and described in Special Provisions.

5. When local stone is used a higher percentage of wear may be allowed when stated in Special Provisions or approved in writing by the State Highway Engineer. Maximum size of stone may be decreased with written permission of State Highway Engineer.

In stock-piling coarse aggregate, care shall be taken to avoid formation of high cones. The bases of piles shall be extended as far as available space will permit, and the material as unloaded, shall be distributed in layers of two (2) feet or thereabout, to prevent segregation. If, however, the material becomes segregated, it shall be re-mixed so as to give the grading required by the specifications.

8. Forms: The width of the forms at their base shall be such that the maximum load under any method

of finishing shall not be more than seven pounds per square inch on the subgrade. In the event the subgrade is unusually soft the use of finishing machine may be discontinued and the standard hand finish substituted. The use of wood or steel blocks to secure the required depth of section shall not be permitted. On all projects exceeding three (3) miles in length new metal forms of approved type shall be furnished. These forms shall be inspected and accepted by Engineer before returned to the work. The Engineer may, however, require additional bearing area under the forms by securely fastening them to planks secured to the subgrade by the required number of pins. The planks shall be of such width and so fastened that no settlement or displacements occur. The length and number of pins shall be increased if necessary to maintain the forms to correct line and grade, but in no case shall less than three be used to each 10 foot section.

9. Devices for Measuring Materials: Insert in Paragraph 9 ''Or especially constructed wheelbarrows.''

11. Insert as follows: ''Except as stated in paragraph 12.''

18. ''Placing Concrete: The mixer is to be located where the pavement is to be laid unless otherwise permitted in writing by State Highway Engineer,'' is a new sentence, also the insert, ''and the sides well spaded.''

20. Placing Transverse Joints: Following inserts are new: ''Their entire length,'' ''and placed midway between crown and bottom of pavement.'' ''Details of these joints are shown on Typical Section. In finishing these joints they shall be checked with an approved straight edge to insure an even surface.''

21. Methods of Finishing Concrete: The insert, ''finished by hand'' is in place of ''rolled and belted.''

22. Hand Finishing: Calls for, two steel templates. In the last sentence, ''if deemed necessary by the Engineer, ''has been added. Rolling has been omitted entirely.

23. Floating: Floating is an important addition as follows: ''After the concrete has been struck off it shall be floated with wood float, as shown on sheet of standards, in the following manner: First use a long sweeping stroke for one time over, then use a short advance stroke of approximately four inches and long cross swing, with board operated diagonally with the center line, in other words do this with the board on a skew. This should be done as often as necessary, reversing the angle alternately, according to the number of depressions and high spots in surface of concrete. When irregularities have been sufficiently worked out, the board may again be used a number of times with a long sweeping stroke, which will smooth off mortar ridges and remove surplus water from time to time as it collects on surface of concrete. When surface of concrete has become dry to that extent where the board begins to hard to pull, the surface may be allowed to dry off sufficiently to produce a dry herring bone finish with the bow belt. Before the final finishing, the surface shall be straight-edged and the finished pavement surface show no deviation from the general surface in excess of one-sixteenth ($1/16$) inch per foot as measured in the following manner: a ten (10) foot straightedge shall be placed parallel to the center line of the roadway, so as to bridge any depressions. Ordinates measured from the face of the straight-edge to the surface of the pavement shall not exceed one-sixteenth ($1/16$) inch for each foot in distance from either point of contact.

24. Belting: Belting remains practically the same, with a slight change in manner of manipulating as follows. This belting shall be of short, longitudinal strokes having a sweeping transverse motion. Bow Belt shall not be dragged longitudinally for first finish. Mechanically operated belts may be substituted for bow belt when approved in writing by State Highway Engineer.

25. Machine Fnishing: 2d Paragraph. Now reads at least three men shall be kept in front of finishing machine to keep sufficient material ahead of strike board and excess material from accumulating and being pushed ahead by strike board or shaping device, etc.

3d Paragraph has been inserted as follows: The maximum weight of finishing machine shall not exceed 4,500 pounds except with permission from State Highway Engineer.

Consolidating and Shaping

27 Floating—Same as for Hand Finishing.

28 Belting—Same as for Hand Finishing.

29 Protection of Concrete: Has been materially changed and reads as follows: As soon as finished, the concrete shall be protected by burlap covers, as directed by the Engineer. The covering shall at once be sprinkled with water and kept wet until removed. When the concrete has hardened sufficiently, and in not less than twelve (12) hours nor more than thirty-six (36) hours these burlap coverings and forms shall be removed, honey-combs pointed up, the entire surface, including sides of the pavement and to a width twelve (12) inches outside of the edges shall be covered with earth or other approved material to a depth of not less than two (2) inches and immediately wet thoroughly. This material shall remain on the concrete for a period of ten (10) days, and be kept soaked with water the entire time. Traffic shall be excluded from the concrete for fourteen days, by the erection and maintenance of suitable barricades, as shown on sheet of standards. If, however, in the opinion of the Engineer, it shall be deemed advisable, traffic may be excluded for a longer period. Satisfactory and competent night and day watchmen shall be furnished, when required by the Engineer.

Whenever, within ten (10) days after laying the pavement, it becomes necessary or expedient for the accommodation of the traffic, to provide crossings, temporary bridges shall be constructed at the Contractor's expense, by placing timbers across the pavement from side to side and covering with plank in such a manner as to keep the traffic clear of the pavement, and later within the curing period, by placing a six (6) inch cushion of dirt of the necessary width over the crossing point.

30. Temperature changed to 32 degrees F. from 35 degrees.

32. After the forgoing period of fourteen (14) days —or such extended period as may have been deemed advisable by the Engineer—has elapsed, the covering on the concrete shall be removed, the surface of the pavement scraped or swept clean, after which the roadway may be opened to traffic.

33. The method of curing known as ponding, may be used if desired, the entire surface of the concrete being kept covered by water for ten (10) days, but shall not be opened to traffic in less than fourteen (14) days or, if the period of exclusion of traffic has been extended, then and in that event, not until the expiration of fourteen (14) days plus the days of such extension.

34. Time of watering reduced ten days from fourteen days.

36. At no time shall more concrete be laid than can be immediately and properly finished and properly covered during daylight, unless adequate artificial light satisfactory to the Engineer is provided.

37. The Contractor will not be required to tar, or fill, transverse joints or cracks in the finished pavement.

38. Basis of Payment: Slight changes made in omitting section of clause reading, which price shall include all concrete and transverse joint materials, and now reads, which price shall include all materials.

Basis of Payment: Under Items 18, 19, 20, 21, 22, slight changes made as noted for Basis of Payment under Type E, Concrete Pavement.

ITEM 23

Plain Portland Cement Concrete Base and Combination Portland Cement Concrete Header Curbing and Base Course

3. Fine Aggregate: Paragraph (c) and (d) new and reads the same as 3d and 4th paragraphs under Local Sand Requirements for Item 17, Type E. Concrete Pavement.

4. Coarse Aggregate: (a) Insertion of new sentence as follows: "When local stone is used a higher percentage of wear may be allowed when stated in Special Provisions or approved in writing by the State Highway Engineer." (c) Gravel: "Maximum size of stone may be decreased with written permission of State Highway Engineer."

6th Paragraph revised and is identical with 7th paragraph regarding stockpiling of coarse aggregate under Item 17, Type E. Pavement.

7. Forms: 1st paragraph, finishing machines has been inserted and last two sentences added which reads "The width of the forms at their base shall be such that the maximum load under any method of finishing shall not be more than seven pounds per square inch on the subgrade. In the event the subgrade is unusually soft the use of finishing machine may be discontinued and standard hand finish be substituted."

The Engineer may require additional bearing area under the forms by securely fastening them to planks secured to the subgrade by the required number of pins. The planks shall be of such width and so fastened that no settlement or displacements occur.

Only approved steel forms shall be used, weighing not less than seven (7) pounds per lineal foot for five (5) inch forms and not less than eight (8) pounds per lineal foot for six (6) inch forms, and not less than nine (9) pounds per lineal foot for seven (7) inch forms, and not less than ten (10) pounds per lineal foot for eight (8) inch forms, exclusive of wedges and pins. The use of wood or steel blocks to secure the required depth of section will not be permitted. These forms shall be inspected and accepted by Engineer before being returned to the work.

9. The length and number of pins shall be increased if necessary to maintain the forms to correct line and grade, but in no case shall less than three be used to each ten (10) foot section.

19. Placing Concrete: The mixer is to be located where the pavement is to be laid, unless otherwise permitted in writing by State Highway Engineer.

20. "As shown on sheet of standards," has been inserted.

21. Wood Float: After the concrete has been struck off with the tamping screed and before the header-forms are set, the surface shall be floated with wood float as shown on sheet of standards, in the following manner. The float shall be moved forward with a combined crosswise and longitudinal motion across the pavement, using full length strokes but not of such length that float will have impact with the form. The advance of each stroke shall be gauged according to consistency of mix and number of irregularities left by tamping template. The floating operation should ordinarily not be done more than once, but in exceptional cases may be repeated as directed by Engineer.

22. The surface of the base course shall be checked with an approved template as shown on the sheet of standards to secure a uniform surface free from all depressions or other irregularities that are more than one-half (½) inch above or below the general surface as checked by a transverse template and a ten (10) foot straightedge. The final finishing for the base course shall be done by a steel or fiber broom at an angle of 45 degrees as directed by the Engineer.

23. Placing Transverse Joints: All joints shall be formed during the placing of the concrete by securely staking an approved bulkhead at right angles to center line and perpendicular to and flush with the surface of the base course. These bars shall be straight and placed midway between top and bottom of base course, so they will extend one-half of their length into the finished work and shall be held in place by the bulkhead and shall not be burred at their ends. Details of these joints are shown in Typical Section.

24. Protection of Concrete: One man to devote entire time to watering each 1,000 feet of base laid less than seven days.

25. All honeycombs in the edges shall be properly pointed up with mortar, and earth thrown up to the sides of the pavement to a width of twelve (12) inches outside the edges.

26. At no time shall more concrete be laid than can be immediately and properly finished during daylight unless adequate artificial light satisfactory to the Engineer is provided.

27. Temperature lowered to 32 degrees F. from 35 degrees.

ITEM 25

Asphaltic Concrete Base Course

New item, attention is called to Pages 82, 83, 84, 85, 86 and 87 of the 1924 Specifications.

ITEM 26

Sheet Asphalt Binder and Surface Course

4. Sand For Surface Course: Sieve Requirements.

Passing	Retained on	Per Cent
10 mesh		95-100
10 mesh	40 mesh	14-30
40 mesh	80 mesh	35-60
80 mesh	200 mesh	20-40
200 mesh		0-5

18. Placing Surface Course Mixture: The depth of this layer shall be gaged at least every three feet by means of a template cut to proper crown and section of roadway as shown on sheet of standards, allowing sufficient depth for compression. Any deviation from standard crown and section as indicated by template shall be immediately remedied by placing new or removing surplus material. Straight edging and back-patching shall be done after initial compression has been secured and while material is still hot.

19. Compacting Surface Course: (a) Two rollers shall be used for securing compression. One shall be an eight (8) to ten (10) ton tandem and the other shall be a ten (10) to twelve (12) ton three-wheel power roller.

ITEM 27

Sand Asphalt Base and Surface Course Construction

14, Sand Foundation: (c) Where there is a deficiency of sand in the subgrade, or the subgrade is otherwise unsatisfactory, original sub-grade shall be removed and replaced with sand or other satisfactory materials as directed by the Engineer. This material shall be placed and properly compacted as directed.

15. Forms: No less than five hundred (500) nor more than one thousand (1,000) feet of forms shall be in place at any one time.

19. Placing Surface Course Mixture: The depth of this layer shall be gaged at least every three feet by means of a template cut to proper crown and section of roadway as shown on sheet of standards, allowing sufficient depth for compression. Any deviation from standard crown and section as indicated by template shall be immediately remedied by placing new or removing surplus material. Straight edging and back-patching shall be done after intial compression has been secured and while material is still hot.

25. Basis of Payment: Except that when sand necessary for the proper preparation of subgrade is hauled in, it will be paid for as borrow or excavation as the case may be, unless otherwise stated in Special Provisions.

ITEM 28

Natural Rock Asphalt Surface Course Construction

5. Placing Surface Course: The clause "or at least free from standing water," has been struck out in 1st Paragraph.

2d paragraph, "and base when deemed necessary by the Engineer," has been inserted.

ITEM 29

Asphaltic Concrete Surface Course

(Course Aggregate Type)

1. General Description: "Exclusive of flush coat," inserted.

5. Intermediate Aggregate: Grading changed as follows:

Passing ¼ inch screen	25-40 per cent
Passing 10 mesh sieve	0-5 per cent

10. Preparation of Mineral Aggregate: (a) When more than two ingredients enter into the composition of the mineral aggregate they shall be combined in a manner satisfactory to the Engineer before entering the elevator.

11. (b) Grading changed to following:

Passing 1¼ inch, retained on ½ inch screen	30 to60%
Passing ½ inch, retained on ¼ inch screen	15 to 25%
Passing ¼ inch, retained on 10 mesh sieve	5 to 15%
Passing 10 mesh sieve, retained on 200 mesh sieve	20 to 35%
Passing 200 mesh sieve	4 to 6%
Bitumen (soluble in carbon tetrachloride)	5 to 8%
Passing 10 mesh and retained on a 40 mesh	15 to 40%
Passing 40 mesh and retained on an 80 mesh	22 to 53%
Passing 80 mesh and retained on a 200 mesh	15 to 40%
Passing 200 mesh	10 to 15%

13. Transportation of Mixture: Referring to canvas covers the word "thickness" has been inserted.

14. Placing Surface Course Mixture: The depth of this layer shall be gaged at least every three feet by means of template cut to proper crown and section of roadway as shown on sheet of standards, allowing sufficient depth for compression. Any deviation from standard crown and section as indicated by template shall be immediately remedied by placing new or removing surplus material.

Straight edging and back-patching shall be done after initial compression has been secured and while material is still hot.

15. Compacting Surface Course: (a) Two rollers shall be used for securing compression. One shall be

an eight (8) to ten (10) ton tandem roller and the other shall be a ten (10) to twelve (12) ton three-wheel power roller.

16. Joints: Clause inserted in 2d sentence as follows: "Surface mixture by cutting or trimming back the joint while the material is hot so as to expose an unsealed or granular surface."

18. Coarse Wearing Surface: New Type of surfacing for details see Pages 112 and 113 of 1924 Specifications.

ITEM 30

Asphaltic Concrete Surface Course

(Fine Aggregate Type)

2. Stone: (b) Stone of the quality specified which fails to meet the requirements in Paragraph (a) may be used provided that when combined with the aggregate specified under sand mineral filler and asphaltic cement, a mixture conforming to the requirements of Paragraph 10 (b) is produced.

3. Sand: Grading revised as follows:

Passing	Retained on	Per Cent
10 mesh		95 to 100
10 mesh	40 mesh	14 to 30
40 mesh	80 mesh	35 to 60
80 mesh	200 mesh	20 to 40
200 mesh		0 to 8

9. Preparation of Mineral Aggregate: (a) Last sentence added and reads: "When more than two ingredients enter into the composition of the mineral aggregate they shall be combined in a manner satisfactory to the Engineer before entering the elevator."

13. Placing Surface Course Mixture: 2d Paragraph, 2d and 3d sentences and 3d paragraph are additions and are identical with changes shown in 19 on sheet 11 of this summary.

14. Compacting Surface Course: (a) 2d paragraph, first three sentences referring to rollers are identical with that shown in 15 on sheet 12 of this summary.

ITEM 31

Bituminous Macadam Surface Course

(Penetration Method)

2. Mineral Aggregate: A higher percentage of wear may be allowed under Special Provisions when it is deemed advisable by the Engineer to use local stone.

ITEM 32

Vitrified Brick Pavement Type B-M

6. Sand Foundation: (c) Where there is a deficiency of sand in the sub-grade, or the sub-grade is otherwise unsatisfactory, original sub-grade shall be removed and replaced with sand or other satisfactory material as directed by the Engineer. This material shall be placed and properly compacted as directed.

29. Basis of Payment: Last sentence added, and reads: "Except that when sand necessary for the proper preparation of sub-grade is hauled in, it will be paid for at contract unit price as borrow or excavation as the case may be, unless otherwise stated in Special Provisions.

ITEMS 38a, b, c, d, e

Corrugated Metal Pipe

1. Description: Addition made to table as follows:

18 inch—14 gauge—2½ in. lap--19.1 Wt. per ft. in lbs.
30 inch—12 gauge--3 in. lap--44.3 Wt. per ft. in lbs.

ITEMS 39a, b, c, d, e

Vitrified Pipe

This item has been re-written and details will be found on Page 144 of 1924 Specifications. Attention may, however, be called to the principal change—1924 calls for double strength, and 1923 called for triple strength, also strength test has been inserted.

ITEMS 41a, b, c, d, e

Reinforced Concrete Pipe

10. Reinforcement: When concrete pipe is of an approved machine made construction, wall thicknesses may be reduced from those in preceding table to conform to the following: 15 in—1¾ in.; 18 in.—2 in.; 24 in.—2½ in.; 30 in.—3 in.; 36 in.—3 in.; 42 in.— 3½ in.; 48 in.—4 in.; 54 in.—4½ in.; 60 in.—5 in.

General Construction of any Pipe Culvert

4. In the event special construction for consolidating foundation for pipe is necessary, the work will be described in special provisions and paid for at the contract unit price or as extra work in event there is no unit price for such work.

ITEM 57 AND 58

Cement Rubble Masonry Headwalls and Retaining Walls

See item B-13 on Pages 243 and 244.

ITEM 59

Class B Concrete Headwalls

See Item B-1 in Bridges and Culverts Section of 1924 Specifications Page 183 to 199.

ITEM 60

Grouted Rip-Rap

Materials: The cement and sand shall comply with the requirements given under "Cement Concrete Masonary," The stone shall consist of field stone or rough unhewn quarry stone as nearly rectangular in section as is practicable. The stone shall be resistant to the action of air and water, it shall be of sufficient density, and suitable in all other respects for the purpose intended.

Grout: Proportions for cement and sand changed to 1 cement and 3 sand in place of 1 cement and 2 sand. Hydrated Lime is not called for in this mortar in 1924 Specifications.

Basis of Payment: "Preparation of sub-grade," now included. "Toe walls shall be paid for at the contract price per square yard of vertical projection," has been added.

SPECIAL PROVISIONS

1. Separate Contract for Structures: Has been revised, the details are given on sheet (1) of this summary.

3. Cement Furnished by State: Cement that has been in storage for more than three (3) months shall

(Continued on page 22)

STATUS OF STATE WORK IN NORTH CAROLINA

Projects Under Construction

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	BEGUN	CONTRACTOR
101	Beaufort	4.23	P. C.	$ 145,492.76	1-20-23	Public Service Production Co.
105B	Beaufort	5.037	P. C.	164,301.61	1-19-23	Public Service Production Co.
107	Bertie	19.30	Graded	50,127.00	3-14-23	Nello Teer—Atlantic Bridge Co.
113B	Chowan	12.20	S. A.	121,000.00	4—9-23	State Forces.
115	Chowan-Perquimans	11.83	P. C.	326,304.00	5-15-23	Smith Brothers, Inc.
118	Currituck	3.40	T. S.	17,840.00	10-10-23	State Forces.
119	Currituck	29.90	T. S.	123,360.00	----------	State Forces.
126 {F A 139A	Edgecombe	7.72	P. C.	288,486.00	11-15-23	Public Service Production Co.
131	Gates	15.95	T. S.	135,515.60	8-22-22	Bacon & Moore—W. D. Murray—Saddler Corp.
132	Gates	10.90	T. S.	63,921.00	8-29-22	J. A. Marrow.
133	Gates-Pasquotank	14.07	Gravel	138,045.77	1-17-22	C. W. Lacy—Pittsburg Des Moines Steel Co.
138A	Halifax-Northampton	12.59	S. C.	131,712.13	5—1-22	Nello Teer—Richards Brothers.
138B	Northampton-Halifax	--------	Bridge	347,188.74	2-28-23	Pensacola Shipbuilding Co.
141	Halifax-Edgecombe	8.76	T. S.	220,679.58	8—8-23	J. P. Dicus—J. A. Peterson.
145	Hertford	12.88	Graded	88,161.42	7-31-22	Jamison & Bro., Atlantic Bridge Co.
146	Hertford-Bertie	6.42	T. S.	60,772.14	8—8-23	Nello Teer—Atlantic Bridge Co.
147	Hertford-Bertie	17.36	Graded	122,245.86	3—5-23	Nello Teer—Atlantic Bridge Co.
151	Hyde	4.30	T. S.	71,422.28	12-10-21	C. W. Lacy—Porter & Peck.
152	Hyde	10.89	S. C.	75,651.40	1-15-23	O. A. Mann & Co.
155B {F A 152	Martin	19.30	P. C.	551,805.10	3-20-23	W. T. Hadlow.
157A	Martin	12.41	T.S.&S.C	85,822.00	10-18-22	Jamison Bros.—J. A. Marrow.
157B	Martin	12.36	T. S.	82,180.00	10-11-22	J. F. Mulligan Constr. Co.—Batson Cook Co.
163 {F A 149	Nash	14.96	P. C.	409,592.40	6-15-23	Public Service Production Co.
167	Northampton	20.48	T. S.	92,444.11	7-17-22	Virginia Contracting Co.—Bacon & Moore.
168	Northampton	16.30	T. S.	107,229.87	8-27-23	Nello Teer.
173	Perquimans-Pasquotank	7.22	R. C.	239,444.70	8-25-22	Williams & Williams.
174	Pasquotank-Camden	2.40	Cord	55,818.01	4—3-22	D. E. Williams.
180	Perquimans	9.96	P. C.	249,192.90	10—8-23	Smith Brothers, Inc.
183B	Pitt	--------	Bridge	32,343.30	3-27-22	B. J. Boyles.
185C {F A 164	Pitt	14.35	P. C.	463,802.35	10—6-23	Groves & Shephard.
187 {F A 159B	Pitt	4.43	P. C.	171,710.00	11-15-23	Public Service Production Co.
189	Pitt	5.30	P. C.	210,247.07	8—7-23	Smith Bros., Inc.—Pittsburg-Des Moines SteelCo.
191	Tyrell	6.91	S. C.	58,594.41	1-20-22	C. W. Lacy—M. M. Jones.
195	Washington	15.18	S. C.	65,626.00	2-27-22	L. M. Lee—B. J. Boyles.
196	Washington	14.93	S. C.	83,632.78	5-15-22	W. N. Thompson.
200B	Carteret	13.68	S. A.	240,000.00	----------	State Forces.
201	Carteret	14.14	Graded	81,652.62	1-17-23	Duplin Construction Co.—Batson-Cooke Co.
213 {F A 151	Craven	10.43	A. C.	447,053.53	8—1-23	F. G. McGuire—Eagle Engineering Co.
219	Duplin-Lenoir	15.80	Graded	148,339.29	6—1-22	Chitwood & Carpenter.
220	Wayne-Duplin	14.53	A. C.	394,301.05	2-27-23	Union Paving Co.
230	Greene	5.40	P. C.	220,576.18	10—6-23	Smith Bros., Inc.—Pittsburg-Des Moines Steel Co.
236 {F A 143	Johnson	14.83	A. C.	475,321.55	10—2-22	R. G. Lassiter & Co.
237A	Johnson	.51	Grade	21,529.20	1—9-24	Jameson & Bro.—Dameron & Spaulding
245	Jones	15.80	P. C.	265,179.53	3-22-22	Hyde & Baxter.
254	Lenoir	--------	Bridge	73,415.32	11-22-22	Roanoke Iron and Bridge Co.
256	Lenoir	--------	Bridges	57,680.00	1-11-23	Englehardt-Kuchen.
282	Wayne	14.22	A. C.	398,168.00	11-11-22	Union Paving Co.
291C	Wilson	0.31	Grade	15,532.00	10-15-23	C. S. Wheeler.
293	Wilson	8.99	P. C.	384,222.08	10-27-23	Smith Bros., Inc.—Pittsburg-Des Moines Steel Co.
294	Wilson	--------	Bridge	15,770.80	11-29-22	Stearns Brothers.
295	Wilson	9.92	Recon.	124,060.64	8-20-23	Highway Engineering and Construction Co.
302	Bladen	1.25	T.S.&Br	286,473.00	11-26-23	J. A. Plott—Atlantic Bridge Co.
311	Brunswick	.50	Grade	5,775.00	12—1-23	C. R. Wise.
316	Brunswick	12.12	S. C.	80,068.72	8-14-22	B. Frank Price—Batson-Cooke Co.
329 F A	Columbus	12.89	P. C.	401,510.00	10—1-23	Jas. O. Heyworth.
340	Cumberland	11.07	P. C.	381,032.02	6-15-22	Alabama Concrete Prod. Co.-Hobbs & Peabody.
342	Cumberland	5.91	A. C.	177,402.50	10-30-22	A. J. Wardrep.
351	New Hanover	10.64	A. C.	189,540.00	1—8-23	Southern Willite Paving Co.
363	Onslow	15.24	T. S.	208,476.95	3—5-23	Newell Constr. Co.—Pittsburg Des Moines Steel Co.
364B	Onslow	12.84	T. S.	99,819.50	6-26-22	A. W. McClay.
366	Onslow	18.5	S. A.	200,000.00	6-15-23	State Forces.
378	Pender	14.12	W. B. Mac	213,502.96	7-19-22	C. W. Lacy.
380	Pender	8.98	W. B. Mac	162,212.60	3—6-23	C. W. Lacy.
386 387 {F A 140	Robeson	19.80	P. C.	647,888.05	9—4-22	Jas. O. Heyworth.
389	Robeson-Columbus	1.56	T. S.	83,463.38	10-26-21	L. A. Chitwood
391B	Robeson	1.10	T. S.	17.433.00	2-26-23	H. M. Beasley.
402	Chatham	6.92	T. S.	33,940.28	8—1-22	W. N. Thompson.
403	Chatham	7.01	Gravel	66,814.00	2-17-23	C. G. Kershaw.

STATUS OF STATE WORK IN NORTH CAROLINA—*Continued*

Projects Under Construction (Continued)

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	BEGUN	CONTRACTOR
404A	Chatham	11.25	Grade	$ 141,878.00	12—1-23	W. W. Tuck & Son—Atlantic Bridge Co.
412	Durham	8.80	P. C.	252,582.00	11-15-22	L. L. Tindall.
421	Franklin	8.23	Grade	61,002.48	10-20-23	J. A. Marrow.
428	Granville	4.19	R. C.	142,637.77	7-14-22	Pittman Construction Co.
429 FA	Granville	6.94	P. C.	261,397.29	3-21-23	R. B. Sandidge.
431	Granville	3.83	T. S.	42,180.00	8-25-23	Micheaux Construction Co.
437	Harnett	10.74	Gravel	101,031.26	5—8-23	F. P. Holden—T. J. Newell.
438	Harnett	3.82	P. C.	158,316.57	7-16-23	J. M. Gregory—T. J. Newell.
457A	Orange	7.45	Graded	75,398.67	4-12-23	Dicus Bros.—Richards Bros.
460	Orange	9.87	A. C.	296,835.55	9-25-22	R. M. Hudson & Co.
463	Person	11.24	P. C.	327,171.35	8-14-22	Porter & Boyd.
464	Person	11.58	T. S.	85,179.27	8-13-23	Micheaux Construction Co.
484	Wake	8.79	P. C.	311,590.40	8-23-22	P. R. Ashby—Booz-Lloyd & Co.
484B	Wake	-------	Bridge	13,112.99	7—2-23	Booz-Boyd.
485A	Wake	7.35	Graded	92,818.00	5—4-23	C. G. Kershaw Constr. Co.—T. J. Newell.
486	Wake	9.04	T. S.	41.074.00	4-11-23	O. A. Mann & Co.
493	Warren	3.39	Bit. Mac.	77,866.80	7-27-22	Porter & Peck.
494 FA 147	Warren	6.21	A. C.	208,130.01	9—6-22	Clifford Engineering Co.
495	Warren	7.81	T. S.	71,122.15	9-18-23	J. A. Marrow.
507	Alamance	4.03	P. C.	121,966.68	10-10-23	Zeigler & Dalton.
511	Caswell	14.80	T. S.	73,242.18	12-12-21	White & Simpson—C. B. Hester.
513	Caswell	16.50	T. S	127,972.90	1—8-24	Nello Teer—R. W. Curtis.
522	Davidson	1.00	P. C.	37,856.50	6-29-23	Hagedorn Construction Co.
528	Davidson	10.24	P. C.	427,511.92	10—2-22	Hagedorn Constr. Co.—J. A. Peterson.
532	Guilford	11.70	A. C.	385,957.88	2—1-22	Eliot & Sholes & Co.
535	Guilford	7.78	R. C.	290,605.21	4-19-22	Leaksville Lumber Co.
537	Guilford	10.40	T. S.	340,000.00	10-29-23	J. M. Gregory.
541	Guilford	4.31	Bit. Mac.	119,469.24	8-15-23	Hagedorn Construction Co.
555	Montgomery	20.55	T. S.	103,703.38	2-19-23	Mayfield Construction Co.—F. P. Holder.
556	Montgomery	3.07	Bit. Mac.	78,704.00	9—4-23	R. G. Lassiter & Co.
556B	Montgomery	3.75	T. S.	17,930.00	11-7-23	J. F. Mulligan Construction Co.
557	Montgomery	2.01	A. C.-S. A.	69,506.25	1-17-24	Wm. F. Bowe, Jr.
570	Moore	22.52	T. S.	89,804.33	5-22-23	A. B. McDonald.
577	Randolph	13.77	P. C.	422,343.57	4-18-22	Royer, Ferguson & Co., Inc.—J. L. Brinkley.
578 FA 156	Randolph	7.97	P. C.	312,662.68	5-10-23	Allport Construction Corporation.
582	Randolph	16.60	T. S.	55,000.00	9—1-23	Jamison & Brothers.
583	Randolph	0.50	Grade	6,000.00	12-17-23	Nello Teer.
588	Rockingham	7.98	R. C.	266,498.43	4-11-22	Cheatwood & Driscoll.
589	Rockingham	9.81	P. C.	324,975.31	10-30-22	Cheatwood & Driscoll—Atlantic Bridge Co.
590	Rockingham	2.10	P. C.	66,092.18	6-15-23	Geo. R. Martin.
592	Rockingham	8.22	P. C.	310,101.66	10-20-23	Zeigler & Dalton—J. L. Brinkley.
602	Alexander	9.28	Bit. Mac.	189,329.80	10—9-22	W. E. Graham.
608	Anson	7.85	A. C.	345,408.58	9-27-22	Lampton & Burks—J. A. Peterson.
608B	Anson	3.83	Grading	44,224.10	7-20-23	Ben F. Teeter—J. A. Peterson.
611	Anson	5.94	P. C.	194,201.26	9—1-23	Jas. O. Heyworth.
614 FA 144	Cabarrus	9.20	P. C.	353,590.00	7-21-22	A. L. Harris—Oliver & Costello Brothers.
616	Cabarrus	8.59	T. S.	46,024.00	4-11-23	Lee J. Smith—L. M. Lefler & Smith.
616Ex	Cabarrus	16.51	Graded	62,684.71	12-11-23	Lee J. Smith.
629	Catawba	7.52	P. C.	268.662.48	6—5-22	A. L. Harris—R. M. Thurmond & Co.
630B	Gaston	6.65	A. C.	218,625.00	8—8-22	W. F. McCanless, Hobbs-Peabody Constr. Co.
632	Gaston	8.50	R. C.	291,868.94	1—2-22	Davis-Wilcox Construction Co.
639	Iredell	10.59	A. C.	387,346.19	1—2-22	R. M. Hudson Co.—Luten Bridge Co.
640	Iredell	8.17	Bit. Mac.	181,990.82	9-26-22	W. E. Graham.
641	Iredell	8.04	A. C.	300,000.00	10—9-23	Iredell County.
643 FA 157	Iredell	8.57	A. C.	321,614.81	5-21-23	Stearns Brothers.
646A	Lincoln	9.88	Graded	35,657.60	------------	J. F. Molligan Constr. Co.—Harris & Spaulding
647	Lincoln	7.10	P. C.	250,108.15	6—5-22	A. L. Harris—R. M. Thurmond & Co.
647B	Lincoln	--------	Bridge	24,350.00	------------	J. S. Bowers.
648A	Lincoln	5.03	Graded	53,450.00	------------	Gus Ginn.
653	Mecklenburg	8.84	A. C.	308,732.43	2-28-22	Union Paving Co.—Luten Bridge Co.
654	Mecklenburg	10.10	A. C.	302,887.09	4—3-22	Lampton & Burks.
658 FA 145	Mecklenburg	9.55	A. C.	266,758.80	10—9-22	Union Paving Co.
659	Mecklenburg	7.93	Graded	36,650.00	4—9-23	County Commissioners—Luten Bridge Co.
661	Richmond	9.76	T. S.	40,683.41	7-18-22	McDonald & Brooks.
665	Richmond	5.77	A. C.	194,501.23	7-28-22	A. J. Wardrep.
666	Richmond	4.65	P. C.	175,052.24	------------	Geo. R. Martin & Co.
670	Cabarrus-Rowan	4.53	P. C.	142,221.53	6-29-22	Harris Construction Co.
671	Rowan	7.43	A. C.	309,262.14	3-20-23	Thompson-Caldwell Constr. Co.—Atlantic Bridge Co.
672	Rowan	3.56	A. C.	160,771.82	8-27-23	Stearns Brothers—J. A. Kreis.
673	Davidson-Rowan	.59	Bridge	221,353.00	9-19-22	Hardaway Contr. Co.—Elliot & Sons.
677	Scotland-Robeson	7.11	R. & P. C.	283,460.61	4-26-22	P. R. Ashby—J. B. Murphy.
679	Scotland	--------	Bridges	12,212.20	7—1-23	P. R. Ashby.
686	----------------	--------	Bridges	58,608.00	------------	J. L. Brinkley & Sons.
691	Union	--------	Bridge	14,520.00	2-13-23	J. S. Brinkley.
694	Union	--------	Bridge	23,549.13	11—4-22	Hagedorn Construction Co.

STATUS OF STATE WORK IN NORTH CAROLINA—*Continued*

Projects Under Construction (*Continued*)

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	BEGUN	CONTRACTOR
696	Union	6.05	A. C.	$ 139,901.30	3-10-23	Redmon Construction Co.
697A	Union	9.5	P. C.	307,183.80	9—1-23	Jas. O. Heyworth.
701	Alleghany-Wilkes	8.00	W. B. Mac	166,245.20	6-16-21	W. E. Graham.
702A	Alleghany	7.75	B. M. & Gravel	209,188.98	10-31-22	O'Brien Constr. Co.—Luten Bridge Co.
711	Ashe	6.50	Gravel	60,000.00	9—7-22	Little Contracting Co.
712 {F A	Ashe	11.06	Gravel	197,687.38	10-24-22	J. T. Plott.
713 {139	Ashe	3.53	P. C.	166,595.00	8-22-22	Overstreet & Nance—Concrete Steel Bridge Co.
726 726A	Caldwell	11.00	Gravel	50,000.00	5—5-23	State Forces J. F. Mulligan Construction Co.
732A	Davie	8.07	Grade	35,475.07	11-19-23	J. F. Mulligan Construction Co.
741 {F A	Forsyth	8.90	P. & R. C.	315,025.81	7-27-22	Hardaway Construction Co.
742 {137	Forsyth	10.62	R. C.	413,067.27	7-20-22	Harris Construction Co.
743 {F A	Forsyth	11.35	A. C.	414,680.00	4—2-23	Atlantic Bitulithic Co.
750 {154	Stokes	14.86	T. S.	93,054.48	9-15-21	J. F. Mulligan Constr. Co.—Lee J. Smith.
750B	Stokes	6.83	T. S.	138,402.00	1—4-24	Mulligan Constr. Co.—Piedmont Constr. Co.
752	Stokes	9.67	T. S.	124,874.75	2-17-23	W. E. Graham.
763A	Surry	10.54	Graded	164,131.00	10-24-23	McDowell Contracting Co.—C. A. Heilig.
765	Surry	3.40	P. C.	112,685.76	10—2-22	Campbell Construction Co.
770A	Wautauga	3.00	Bit. Mac.	40,000.00	8-12-22	State Forces.
770B	Wautauga	8.90	Gravel	93,500.00	4-16-23	State Forces.
771A	Wautauga	2.50	Bit. Mac.	30,000.00	9—7-22	State Forces.
771B	Wautauga	13.50	Gravel	35,000.00	9—7-22	State Forces.
780	Wilkes	7.83	Recon.	25,000.00	11-25-21	J. F. Mulligan—State Forces.
781	Wilkes	14.50	Recon.	154,000.00	8—8-21	J. F. Mulligan—State Forces.
790	Yadkin	10.12	P. C.	330,254.27	4-24-22	Pittman Construction Co.
791	Yadkin	13.40	Grade	127,040.76	12-19-23	W. E. Graham—Luten Bridge Co.
800	Avery	5.84	Gravel & R. C.	198,827.02	7-31-22	O'Brien Constr Co.—J. A. Kreis.
802	Avery	5.68	Graded	98,043.44	7-30-23	Hughes & Rae.
811B	Burke	--------	Bridge	16,013.80	8-10-23	R. W. Curtis.
812A	Burke	4.89	Grading	58,629.01	7—6-23	M. A. Kolloch—Padgett & Justice.
815	Burke-Cleveland-Lincoln	11.63	T. S.	153,126.60	3-20-23	Geer & Wilson—J. L. Von Glahn.
822 {F A 150	Cleveland	10.47	A. C.	404,444.48	9-27-22	Elliot & Sons—J. A. Kreis & Co.
835 F A	Henderson	6.82	W. B. Mac	286,019.91	9—9-23	J. B. Ross, Jr.—R. C. Stevens.
836A	Henderson	9.10	Grading	168,630.00	7-13-23	J. B. Hawkins—J. L. Von Glahn & Co.
846	McDowell	10.06	Gravel	204,680.74	9-22-21	Asheville Constr. Co.—W. T. Taylor Constr. Co
846A	McDowell	.73	Grade	28,420.00	7-16-23	Asheville Construction Co.
847	McDowell	3.84	Graded	91,217.50	10-19-22	C. W. Lacy—Oliver & Costello Brothers.
848	McDowell	--------	Bridge	18,597.04	11-21-22	R. M. Thurmond & Co.
849	McDowell	14.00	Gravel	75,000.00	10—2-23	State Forces.
856	Mitchell	6.88	Bit. Mac.	239,343.83	3-20-22	Porter & Boyd—L. J. Chandler & Co.
858	Mitchell	--------	Bridge	42,367.49	10—2-22	R. M. Thurmond & Co.
860	Mitchell	5.58	W. B. Mac	152,922.00	4-30-22	J. F. Mulligan Constr. Co.—W. H. Anderson Constr. Co.
882	Rutherford	15.80	T. S.	94,666.00	9-20-22	C. R. Willard & Sons.
888	Yancey	15.22	W. B. Mac	230,499.94	10-10-22	The Luck Co.
901 {F A	Buncombe	7.52	P. C.	354,082.45	11—6-22	R. C. Stevens—A. J. Wardrep.
902 {148	Buncombe	4.95	P. C.	236,111.70	10—8-23	Wilson Construction Co.—R. G. Rand.
903	Buncombe	2.58	A. C.	100,399.47	4-10-22	Asheville Paving Co.—R. C. Stevens.
911	Cherokee	10.33	Gravel	144,991.44	10-25-21	H. A. Wells—Southern Dray Co.
913	Cherokee	10.33	W. B. Mac	95,554.80	8—8-22	Mills-Williams Construction Co.
920	Clay	5.01	Gravel	50,716.66	1—9-22	E. A. Wilson & Co.—W. T. Moore Conc Prod Co.
940	Haywood	7.13	W. B. Mac	126,069.30	4-14-22	Alexander & Patton—H. A. Brown & Co.
944 {F A	Haywood	10.18	A. C.	410,068.45	5-14-23	A. J. Wardrep.
950 {16	Jackson	7.56	Gravel	145,313.30	6-13-21	Wright & Nave—O'Brien Constr. Co.
951	Jackson	11.58	W. B. Mac	249,546.00	8-17-22	R. H. Wright & Sons—W. T. Moore Conc. Prod. Co.
952A	Jackson	10.35	Graded	164,126.60	8-17-22	Brooks-Calloway Co.
953	Jackson	12.72	Graded	118,186.75	7—1-22	C. C. McCabe.
960	Macon	4.97	S. C.	69,100.57	6—6-21	J. T. Plott—J. E. Lane & Co.
961	Macon	4.77	T. S.	58,340.59	12-5-21	J. T. Plott—J. E. Lane & Co.
962	Macon	13.58	W. B. Mac	171,200.05	4-24-22	O'Brien Constr. Co.—Griffin Constr. Co.
963	Macon	8.68	Graded	124,354.01	11-10-22	Costello Bros.—Brooks-Calloway Co.
970	Madison-Yancey	13.80	Gravel	218,940.17	11-11-21	R. H. Wright & Sons—O'Brien Constr. Co.
971	Madison	6.74	Gravel	183,090.38	4-23-23	Reynolds Constr Co.—Moore Conc. Prod. Co.
972	Madison	6.60	Grading	50,000.00	4—6-23	State Forces—C. M. Dicus.
980	Macon-Swain	17.84	W. B. Mac	350,175.11	3-20-22	Costello Bros.—Condon & Condon.
990	Transylvania	8.87	W. B. Mac	151,238.89	6—5-22	Sam L. Davis Constr. Co.—R. C. Stevens.
991	Transylvania	7.03	Graded	156,653.20	3—6-23	Gibson Construction Co.

STATUS OF STATE WORK IN NORTH CAROLINA—*Continued*

Projects Completed

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
100	Beaufort	10.50	R. C.	$ 369,777.70	3-15-23	W. T. Hadlow
103	Beaufort	.03	R. C.	1,706.75	7—3-22	R. G. Lassiter.
105A	Beaufort	2.00	P. C.	78,839.42	7-16-23	J. L. McGhee Contracting Co.
106	Bertie	7.12	T. S.	58,204.90	12-3-23	J. F. Mulligen Constr Co—Boney & Hostetler
108	Bertie		Sheet P.	13,481.86	1-17-24	E. T. Gwathmey.
110	Camden	2.71	R. C.	134,866.48	7-20-23	State Forces.
113	Chowan	10.32	Graded	39,743.33	3—1-23	Nello Teer—Gregory & Talbot.
114	Chowan	10.40	Graded	45,064.09	4-14-23	Battershill & Goode—Chandler & Ragland.
125	Edgecombe	15.11	A. C.	426,438.76	4-23-23	R. G. Lassiter.
129	Edgecombe	8.10	Graded	40,850.00		State Forces.
137	Halifax	5.95	Bit Mac. and P. C.	180,441.92	1-19-24	O. F. Leighton—A. C. House.
139	Halifax		Bridge	*20,425.59	8-25-22	Chandler & Ragland—Porter & Peck.
140	Halifax		Bridge	*11,043.05	5—5-22	Von Glahn & Talbott.
154	Martin	11.27	A. C.	394,153.29	11-16-23	So. Willite Paving Co.—O. F. Leighton, Inc.
154B	Martin	1.34	A. C.	37,690.00	10—8-23	State Forces.
155	Martin	19.3	S. C.	99,201.30	8—9-23	J. P. Dicus—J. M. Gregory.
159	Nash	11.22	T. S.	89.942.43	7-30-23	J. A. Kreis & Co.
160	Frklin.-Wake-Nash	8.93	T. S.	53,722.95	3—7-23	Chandler & Ragland—Southern Dray Co.
166	Northampton	.47	Bridge	17,954.75	9-14-22	W. D. Murrey—Sadler Corp.
175	Pasquotank	9.50	Brick	217,405.72	4-19-23	County Commissioners.
183A	Pitt	13.54	P. C.	399,854.40	9-20-23	S. J. Groves & Sons.
184	Pitt	7.14	P. C.	206,516.42	9-25-23	Public Service Production Co.
185	Pitt	14.35	Graded	31,069.72	8-13-23	J. A. Marrow.
186	Pitt	9.57	R. C.	*248,103.78	8—5-22	Cheatwood & Driscoll.
200	Carteret	13.68	Graded	79,629.00	1-23-24	Eagle Engineering Co.—Batson-Cooke Co.
207	Craven	3.00	Gravel	10,000.00	11-30-22	State Forces.
208	Craven	4.50	Gravel	15,000.00	11-25-22	State Forces.
209	Craven	2.65	P. & R. C.	*114,569.02	1-28-22	Eagle Engineering Co.
210	Craven	8.34	A. C.	292,698.06	12-26-23	West Construction Co.—A. P. Gilbert.
211	Craven	9.93	A. C.	288,946.02	5-16-23	Union Paving Co.
218	Wayne-Duplin	16.06	Graded	*97,186.30	2-24-23	C. W. Lacy
227	Greene	6.81	A. C.	239,797.80	1-25-23	West Construction Co.—Union Paving Co.
255	Lenoir	0.82	S. A.	*30,384.89	8-18-22	West Construction Co.
263	Pamlico	12.03	A. C.	289,324.20	10—8-23	Union Paving Co.
264	Craven Pamlico		Bridge	27,156.25	10-24-23	Rhyne & Kitchen.
272	Sampson	16.47	Graded	98,807.39	11-16-23	R. E. Martin—Striblin-Standdy & Newell.
273	Sampson	2.44	P. C.	96,916.82	10-31-23	Eagle Engineering Co.
275	Sampson		Bridges	8,769.74	8-22-23	Rhyne & Kitchen.
280	Wayne	10.01	A. C.	311,352.36	5-12-23	Union Paving Co.
281	Wayne		Bridge	*21,225.49	1-15-23	P. R. Ashby.
291	Wilson	7.50	A. C.	203,493.18	12-15-23	P. R. Ashby.
291B	Wilson		Bridges	12,990.23	11—1-23	John M. Ogden & Co.
300	Bladen	11.99	S. C.	64,911.71	6-16-23	T. W. Chandler—Nello Teer.
301	Bladen	13.17	T. S.	82,028.21	2-20-23	J. F. Mulligan—Powell Paving and Constr. Co.
312	Brunswick	9.77	P. C.	347,319.68	11-23-23	Alabama Con. Prod. Co.—Batson Cooke Co.
313	Brunswick	3.44	A. C.	105,706.65		Sou. Willite Paving Co.—Roanoke Br. Works.
314	Brunswick	15.82	S. C.	109,259.10	11-23-23	Hagedorn Construction Co.
317	Brunswick		Bridge	19,783.20	6-2—23	Atlantic Bridge Co.
325	Columbus	11.22	T. S.	105,530.04	7-14-23	J. A. Kreis—Cornell & Young & Co.
326	Columbus	13.61	S. C.	195,838.19	8-18-23	J. T. Plott—J. A. Kreis & Co.
327	Columbus	5.20	S. C.	38,269.44	6-13-22	J. A. Kreis.
328	Columbus	7.03	P. C.	219,370.00	10—9-23	L. L. Tindall.
338	Cumb.-Sampson		Bridge	*29,223.84	9-26-22	Roanoke Bridge & Iron Works.
339	Harnett-Comb.	.754	T. S.	*21,031.64	8-31-22	Porter & Boyd
341	Cumb-Hoke	.2	Graded	*1,042.55	2-28-22	W. B. Covington
364A	Onslow	9.95	S. C.	44,631.40	4—7-23	R. E. Martin.
375	Pender	13.56	S. C.	68,830.09	11-21-22	A. W. McClay
376	Pender	7.64	Graded	94,757.85	3—5-23	C. G. Kershaw—Cornell-Young Co.
377	Pender	1.61	Graded	76,895.70	4-30-23	R. E. Martin—Hazell-Connerst-Quist Co.
379	Pender	10.50	S. A.	100,000.00		State Forces.
382	Pender	5.60	S. A.	60,000.00		State Forces.
388	Robeson	3.35	R. C.	137,009.40	9-28-22	C. W. Lacy—Roanoke Bridge & Iron Co.
391A	Robeson	1.00	S. A	43,330.00	11-21-23	R. G. Lassiter & Co.
392	Robeson	1.06	T. S.	85,049.91	12-14-23	Robeson County Com.—E. T. Gwathney
400	Chatham		Bridge	57,420.22	5-18-23	R. M. Walker & Co.
400A	Chatham		Grading	5,400.00	8-27-23	C. B. Hester.
408	Durham	.47	S. A.	4,820.00	9-20-23	Murray Construction Co.
409	Durham	0.5	Graded	*5,409.10	8—7-22	J. P. Dicus.
410	Durham	2.3	R. C.	*81,105.75	9-28-22	C. D. Riggsbee.
411	Durham	5.81	P. C.	211,574.92	7-12-23	Hutton Engineering and Construction Co.
419	Franklin	12.82	T. S.	63,021.97	7-31-23	Jamison & Brother—J. A. Marrow.
420	Franklin	1.56	R. C.	55,421.30	5-29-23	Chandler & Ragland.
427	Granville	5.12	A. C.	178,257.64	1—4-23	R. G. Lassiter & Co.
436	Harnett	21.91	Gravel	202,563.88	1-15-23	C. G. Kershaw Const. Co.—Hobbs & Kitchen
445	Lee	5.91	T. S.	18,692.85	1-15-23	C. B. Hester.

(*Final Cost)

STATUS OF STATE WORK IN NORTH CAROLINA---*Continued*

Projects Completed—Continued

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	COMPLETED	CONTRACTOR
446	Lee	5.05	A. C.	209,090.00	1-15-24	Atlantic Bitulithic Co.—O. A. Mann.
453	Orange	--------	Bridge	33,706.80	1—9-23	Geo. W. Kane.
454	Orange	4.28	P. C.	197,675.32	3—6-22	Elliott, Sholes & Teer.
455	Orange	4.19	T. S.	*55,214.44	9-28-22	J. F. Mulligan Const. Co.—P. R. Ashby.
456	Orange	9.81	Graded	37,459.07	10-25-23	Crawford & Crawford—Nello Teer.
473 {F A 146	Vance	7.83	P. C.	265,546.60	------------	R. G. Lassiter & Co.
481	Wake	7.40	A. C.	254,995.34	7-30-23	Union Paving Co.—P. R. Ashby.
482	Wake	6.64	A. C.	*184,393.31	9-23-22	R. M. Hudson Company.
483	Wake	0.54	R. C.	*15,630.74	8--7-22	C. D. Riggsbee.
485C	Wake	0.50	Grade	10,613.90	7-31-23	Booz-Boyd—Nello Teer.
492	Warren	4.48	Bit. Mac.	100,436.13	11-9-23	Porter & Peck—A. C. House.
500	Alamance	5.22	Graded	*36,844.34	1-17-22	W. W. Tuck & Son—A. M. Hazell, Connerate—Quist Construction Co.
501	Alamance	13.1	T. S.	30,927.27	2-28-23	W. M. Shook-Hanford Bros.
502	Alamance	17.43	T.S.&B.M.	138,629.97	9-13-23	W. E. Graham—Hanford Brothers.
503	Alamance	--------	Bridge	59,450.38	7-20-23	Atlantic Bridge Co.
504	Alamance	5.22	A. C.	154,127.16	5—3-23	Elliot & Sholes.
505	Alamance	0.42	S. A.	*15,229.74	6-23-22	Hedrick Construction Co.
506A	Alamance	0.32	Grade	8,866.45	8-11-23	Nello Teer.
506B	Alamance	.03	P. C.	10,000.00	1-12-24	W. B. Kiker.
512	Caswell	11.67	T. S.	$ 54,375.53	11-14-23	J. T. Plott.
524	Davidson	0.3	S. A.	*9,941.54	1-20-22	Town of Lexington.
525	Davidson	10.24	A. C.	363,850.08	9—4-23	Elliot & Sons & Boggs—Austin Bros. Bridge Co.
525A	Davidson	.5	S. A.	*16,419.86	6-27-21	Town of Lexington.
526	Davidson	3.77	P. C.	*131,269.66	10-25-22	Hagedorn Constr. Co.—Heilig & Sherrill.
532B	Guilford	--------	Bridges	24,730.00	10—8-23	L. M. Lowdermilk.
532C	Guilford	.5	P. C.	12,650.00	------------	W. B. Kiker.
533	Guilford-Forsyth	10.59	P. C.	427,997.62	7-23-23	Royer-Ferguson Construction Co.
538	Guilford	--------	Bridge	7,039.01	2-21-23	J. L. Brinkley.
539	Guilford	0.64	S. A.	21,639.20	1-19-23	Robt. G. Lassiter & Co.
540	Guilford	18.00	Recon.	16,527.54	1-23-22	J. T. Plott.
544	Hoke	10.45	S. C.	32,445.49	5—3-23	O. A. Mann & Co.—Chitwood & Carpenter.
545	Hoke	9.15	T. S.	58,195.01	------------	O. A. Mann & Co.—A. W. McClay.
546	Hoke	0.84	S. A.	27,949.00	5-30-23	Dawkins Construction Co.
566	Moore	7.14	T. S.	62,079.21	6-30-23	Gibson Construction Co.—Nello Teer.
567	Moore	2.96	T. S.	*9,967.53	9-18-22	C. E. Teague.
569	Moore	18.97	S. C.	97,151.45	10-28-23	Mayfield Constr Co.
593	Rock'gham-Caswell	17.98	P. C.	552,393.22	8-18-23	J. A. Kreis.
600	Alexander	9.30	Graded	12,530.98	4-14-23	Bolton Construction Co.
601	Alexander	3.07	T. S.	33,630.45	3-31-23	Guss Ginn-R. M. Thurmond
606	Stanley-Anson	--------	Bridge	55,802.03	6—6-23	Concrete Steel Bridge Co.
607	Anson	6.93	T. S.	41,324.35	5-17-23	Geer & Wilson—Booz-Lloyd & Co.
615	Cabarrus	3.88	A. C.	98,741.17	6—1-23	Thompson-Caldwell—Atlantic Bridge Co.
622	Catawba	10.85	A. C.	353,590.00	5-25-23	Union Paving Co.
630A	Gaston	3.02	A. C.	*98,854.41	7- -22	W. F. McCanless.
633A	Gaston	7.67	A. C.	180,000.00	10-5-22	Gaston County
633B	Gaston	3.86	A. C.	68,000.00	10-14-23	Gaston County.
634	Gaston	Bridge	Recon.	*4,344.00	------------	State Forces.
638	Iredell	7.88	A. C.	262,142.65	1-20-23	Thompson-Caldwell Co.
652	Mecklenburg	--------	Bridge	1,923.28	10-30-22	State Forces.
655	Mecklenburg	1.57	P. C.	51,658.44	7-31-22	Speed-Parker Co., Inc.—Luten Bridge Co.
656	Mecklenburg	10.4	Bit.-Mac.	7,198.07	10-30-22	State Forces.
657	Mecklenburg	13.80	Recon.	15,961.02	10-30-22	State Forces.
692	Union	2.28	A. C.	*65,279.20	12-28-21	Redmon Construction Co.
693	Union	1.14	T. S.	3,324.48	2-23-23	Sykes-Collins Co.
695	Union	4.51	A. C.	*138,738.07	9-14-22	Redmon Construction Co.
700	Alleghany	7.90	W. B. Mac	132,297.33	11-14-23	W. E. Graham.
702B	Alleghany	6.49	Gravel	191,737.26	------------	Turner-Hartsoe—Luten Bridge Co.
703 {F A	Alleghany	4.99	Bit. Mac.	155,889.13	------------	State Forces.
710 125A	Ashe	3.14	P. C.	*142,707.93	8-17-22	Pittman Construction Co.
719	Caldwell	--------	Bridge	*7,906.87	9-19-22	Cottrell & Howard.
719B	Caldwell	.99	Gravel	*1,235.33	11-15-22	J. G. Bumgardner
722	Caldwell	7.40	Recon	*20,923.25	1-18-22	County Forces.
724	Caldwell	4.66	T. S.	51,890.66	7-24-23	County Forces—R. M. Thurmond & Co.
725	Caldwell	4.00	Recon	28,015.46	2-24-23	County Commissioners.
731	Davie	5.46	P. C.	195,393.11	7-21-23	G. R. Martin—Heilig & Sherrill.
744	Forsyth	2.00	T. S.	15,000.00	2-22-23	Forsyth County.
751	Stokes	7.16	T. S.	*35,124.08	8-26-22	W. E. Graham.
760	Surry-Alleghany	6.9	T. S.	*32,084.18	11-5-22	W. E. Graham.
761	Surry	2.22	P. C.	77,334.01	10-27-23	Geo. R. Martin
764	Surry	1.63	R. C.	50,588.20	2—4-23	Leaksville Lumber Co.
782	Wilkes	5.97	R. C.	184,614.65	8—4-23	Hyde & Baxter.
783	Wilkes-Watauga	36.00	Gravel	159,000.00	------------	Chandler & Ragland.
784	Wilkes	4.97	T. S.	85,966.21	1-12-24	J. F. Mulligan Constr. Co.—Foster Constr. Co.
785	Wilkes	2.52	P. C.	78,703.50	10-1-23	J. D. Brookshire & Co.

(*Final cost)

STATUS OF STATE WORK IN NORTH CAROLINA---*Continued*

Projects Completed (Continued)

NO.	COUNTY	LENGTH	TYPE	APPROXIMATE COST	COMPLETED	CONTRACTOR
801	Avery	.99	W. B. Mac	22,350.24	10-26-22	Geer & Wilson.
811	Burke	5.24	P. C.	185,132.97	10-30-23	Southern Dray Co.
814	Burke	8.69	S. C.	13,459.60	4-25-23	M. A. Kollock.
821	Cleveland	1.58	P. C.	60,192.33	----------	Davis-Wilsox Construction Co.
823	Cleveland	1.90	P. C.	*80,421.65	8-15-22	Southern Paving Co.—Z. B. Weathers & Son.
833	Henderson	5.20	Gravel	34,952.94	10-26-23	S. L. Davis Constr. Co.—Asheville Constr. Co.
837B	Henderson	5.83	A. C.	83,090.00	10-20-23	Dixon Construction Co.
844	McDowell	2.05	P. C.	*61,233.34	12-13-21	Bolton Construction Co.
845	McDowell	7.19	Gravel	132,177.93	12-22-22	J. W. Stapp Constr. Co.–Praytor, Howton&Wood
855	Mitchell	4.72	P. C.	174,393.78	4-17-23	Fisk-Carter Construction Co.
855B	Mitchell	--------	Bridge	*22,699.85	8-22-22	Luten Bridge Co.
866	Polk	5.96	Bit. Mac.	180,393.40	----------	Southern Paving Co.—Henry Constr. Co.
875	Rutherford	--------	Bridge	*6,151.61	7-18-22	Geer & Wilson
876{F A 78B	Rutherford	4.80	P. C.	146,264.80	8-23-23	Fisk Carter Construction Co.
877	Rutherford	9.79	T. S.	64,563.73	8—7-22	Geer & Wilson.
878	Rutherford	6.55	T. S.	44,984.50	10-27-22	Micheaux Const. Co.—Geer & Wilson.
879	Rutherford	--------	Bridge	*6,781.99	6-21-22	Austin Bros. Bridge Co.
880	Rutherford	--------	Bridge	24,679.43	3-23-23	Austin Bros. Bridge Co.
882B	Rutherford	--------	Bridge	10,582.00	9—-23	Micheaux Constr Co.—Lee J. Smith Constr. Co.
904	Buncombe	1.60	A. C.	80,969.13	6-23-23	Asheville Paving Co.—R. C. Stevens.
910	Cherokee	7.56	Gravel	76,743.59	2-24-23	Ross Bros. Constr. Co.—W. T. Moore Conc. Prod. Co.
921	Clay	12.37	Gravel	90,988.02	10-26-23	L. J. Smith Constr. Co.—W. T. Moore Conc Prod Co
930	Graham	12.90	Gravel	143,574.20	11-26-23	Lee J. Smith Construction Co.—C. M. Dicus.
930A	Graham	2.92	Gravel	25,340.70	11-26-23	C. M. Dicus
942	Haywood	0.57	Gravel	*6,490.43	2—1-22	O'Brien Construction Co.
954	Jackson	1.68	P. C.	90,871.77	11-24-23	Mills-Williams Construction Co.

PROJECTS UNDER CONTRACT

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	CONTRACTOR
148{F A 160	Hertford-Gates	--------	Bridge	$ 148,412.00	Roanoke Iron & Bridge Co.
202	Carteret	--------	Bridge	20,548.00	Roanoke Iron & Bridge Co.
222	Duplin	10.01	S. A.	290,876.30	Highway Engineering and Construction Co.
352	New Hanover-Brunswick	2.31	W. B. Mac.	82,994.00	Highway Engineering and Construction Co.
381	Pender	11.99	S. A.	264,301.40	Highway Engineering and Construction Co.
449A	Lee	2.51	Graded	29,021.30	Austin & Ritchie—C. D. Riggsbee.
457B	Orange	7.32	P. C.	253,371.36	L. L. Tindall.
485B	Wake	7.81	P. C.	271,095.00	R. G. Lassiter & Co.
472B	Vance	5.3	T. S.	84,948.60	C. A. Ragland—Rhyne & Kitchen.
536	Guilford	5.15	P. C.	189,193.40	Hagedorn Construction Co.
537A	Guilford	6.20	Grade	41,830.00	J. M. Gregory.
571	Moore	4.94	S. A.	89,848.00	Wesco Construction Co.
662A	Richmond	6.19	Graded	72,731.80	T. W. Chandler—Yadkin Construction Co.
720	Caldwell	--------	Bridges	39,128.70	Berry-Fortune Construction Co.
732B	Davie	8.07	P. C.	311,033.80	Hardaway Construction Co.
836B	Henderson	9.51	P. C.	308,418.00	J. M. Gregory & Co.
852	McDowell	10.85	P. C.	221,044.34	Appalachian Construction Co.
912	Cherokee	--------	Bridges	93,676.00	W. T. Moore (Roadway Not Let)
912A	Cherokee	8.62	Graded	89,107.37	Wilson Construction Co.
912B	Cherokee	8.35	Graded	36,279.21	W. T. Moore.
990A	Transylvania	.47	W. B. Mac.	13,253.02	Piedmont Construction Co.
992	Transylvania	1.57	Graded	67,771.88	W. H. Anderson Construction Co.—R. C. Stevens.

STATUS OF FEDERAL AID WORK IN NORTH CAROLINA

Projects Under Construction

NO.	COUNTY	LENGTH	TYPE	ESTIMATED COST	BEGUN	CONTRACTOR
15	Guilford	4.205	Bit. Mac.	$ 5,441.75	9—1-17	County Commissioners.
61	New Hanover	2.186	P. C.	234,841.39	7-12-20	C. W. Lacy.

Summary

WORK UNDER CONTRACT

Type	STATE		FEDERAL AID	
	Length	Cost	Length	Cost
P. C.	48.71	$ 1,554,155.90		$
S. A.	26.94	645,025.70		
W. B. Mac.	2.78	96,247.02		
T. S.	5.30	84,948.60		
Graded	33.24	336,741.56		
Bridges		301,764.70		
Total	116.97	$ 3,018,883.48		
WORK UNDER CONSTRUCTION				
P. C.	354.657	$ 11,821,684.61	2.19	$ 234,841.39
R. C.	42.78	1,514,515.66		
A. C.	227.93	7,627,618.11		
S. A.	44.38	561,000.00		
Bit. Mac.	40.60	956,704.49	4.21	5,441.75
W. B. Mac.	128.05	2,355,186.76		
T. S.	398.13	3,300,699.73		
S. C.	77.59	564,386.01		
Grade	260.39	2,528,033.29		
Recon.	32.25	303,060.64		
Cord	2.40	55,818.01		
Gravel	163.87	2,172,827.10		
Bridges		1,257,554.81		
Total	1,773.03	$ 35,019,089.22	6.40	$ 240,283.14
WORK COMPLETED				
P. C.	135.54	$ 4,682,673.23	25.56	$ 889,940.67
R. C.	40.81	1,393,393.77		
A. C.	176.33	5,363,718.48	42.29	1,521,368.25
S. A.	21.09	329,714.23	22.91	763,048.82
Bit. Mac.	25.83	443,916.73	30.62	798,895.02
W. B. Mac.	8.89	154,647.57	28.39	769,653.07
Brick	9.50	217,405.72		
T. S.	191.01	1,394,506.50	509.18	5,228,132.54
S. C.	127.54	750,538.17	83.90	785,198.22
Gravel	121.60	1,089,804.28	42.56	488,699.18
Graded	124.48	722,169.77	29.23	252,426.17
Recon.	43.20	85,771.27		
Bridges		487,445.61		651,051.10
Totals	1,025.82	$ 17,115,705.33	814.64	$ 12,148,413.04

Total Roadway Mileage 3,736.86. Total estimated cost of Roadway $64,844,557.99. Total estimated cost of Bridges $2,697,816.22. Corrected to February 1, 1924.

LEGEND

P. C.—*Plain Concrete. R. C.—*Reinforced Concrete. A. C.—*Asphaltic Concrete. S. A.—*Sheet Asphalt. Bit. Mac.—*Bituminous Macadam. W. B. Mac.—*Water Bound Macadam. T. S.—†Top Soil. S. C.—†Sand Clay. Gravel—†Gravel. Graded—†Graded. Recon.—†Reconstruction. Cord.—†Corduroy.

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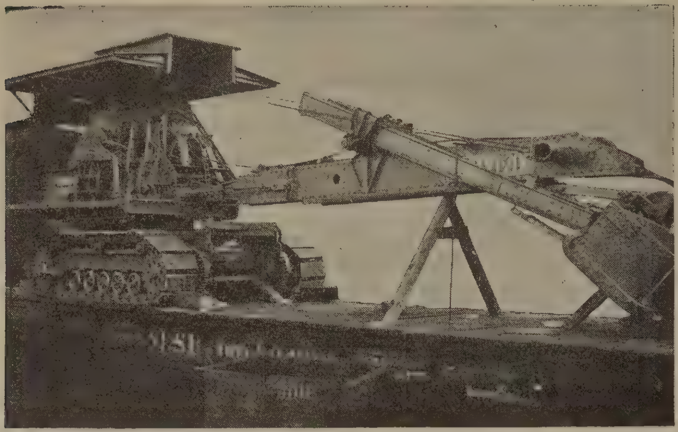
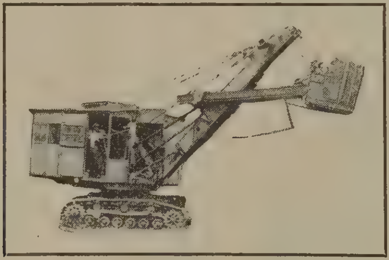
* Hard Surface. † "G" Type.



P & H 206—¾ yd. Shovel on Flat Car for Shipping

For years—

owners of P&H Gasoline Shovels have loaded them onto flat cars under their own power without any dismantling whatsoever. This has saved both time and money.



CORDUROY

Follow the Corduroy Trail
—the "Tread" Mark
of the P & H

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Largest Manufacturers of
Gasoline Driven Excavating Machinery

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SALES REPRESENTATIVE:
Tractor & Machinery Sales Company,
3108 N. Boulevard., Richmond, Va.

P&H GASOLINE SHOVEL

Changes in Specifications

(Continued from page 14)

be retested. If results of retest do not meet specifications, and the reason is on account of improper storage conditions furnished by Contractor, then expense of re-lacing such cement shall be deducted from money due him.

If, at any time the cement company shall experience such difficulty in securing cloth sacks as in its opinion make shipment in cloth sacks impracticable, upon five days' notice to the purchaser, it may, (until such difficulty is removed) ship in paper sacks at a price of 25c less per bbl. than price herein quoted. Paper sacks will not be re-purchased by the cement company.

4. Admixtures: "When admixtures are to be used" has been substituted for "Hydrated Lime."

"When necessary and approved in writing by State Highway Engineer, a unit price per square yard of pavement will be allowed the Contractor for hauling and manipulation." has been added.

SCHEDULE OF PRICES

Roadway Items

9. Changed to Tonnage Basis, from Square Yards.

11. Reconstructed Base Course to be paid for as tons of coarse stone, tons of screenings and square yards of manipulation.

16-a. Water-bound Macadam Base and Surface Course Class A, has been changed to Tonnage Basis. Item for screenings has been added and to be paid for on Tonnage or square yard basis.

16-B. Similar changes made for payment for Class B, Macadam as for Class A Macadam as shown above.

19-A. New item and called for in Special Provisions.

23-A. New item and called for in Special Provisions.

25. New item, new type of paving.

In the event it becomes necessary, in the opinion of the Engineer to lower the footings of abutments, piers, bents, or retaining walls, thereby increasing the height of the stem, the "Extra Excavation" will be paid for at the following price: "Extra Excavation," without classification, as called for in specifications.

CONTRACT

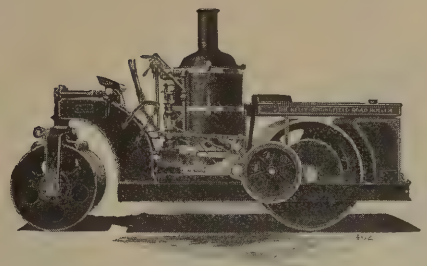
Article One: Time Limit changed to (20) days as follows:— The Contractor shall begin work within twenty (20) days after the contract is mailed for execution.

Article Three: A end of 1st paragraph where it states that the Commission may take possession of machinery, there is inserted "(Teams and all other equipment of whatever character)."

The words (and equipment) added to end of paragraph in place of (implements, tools and materials,) which have been stricken out.

Article Five: Is new and reads as follows: This contract is valid only when signed by the Chairman of the State Highway Commission, and the conditions and provisions herein can not be changed except over the signature of the said Chairman.

BUFFALO-SPRINGFIELD ROLLERS



—The choice of experienced users.

Obtainable in all weights and types—
either steam or motor propelled.

INQUIRIES INVITED

The Buffalo Springfield Roller Co.
Springfield, Ohio.

North Carolina Agent E. F. CRAVEN Greensboro
"The Road Machinery Man"

Washed and Screened
Sand, Gravel, Crushed Stone

Conforming to the specifications of the North Carolina State Highway Commission

Prompt shipments by rail or water
Favorable freight rates to all North Carolina points
Quotations gladly furnished on request

THE ARUNDEL CORPORATION

MAIN OFFICE:
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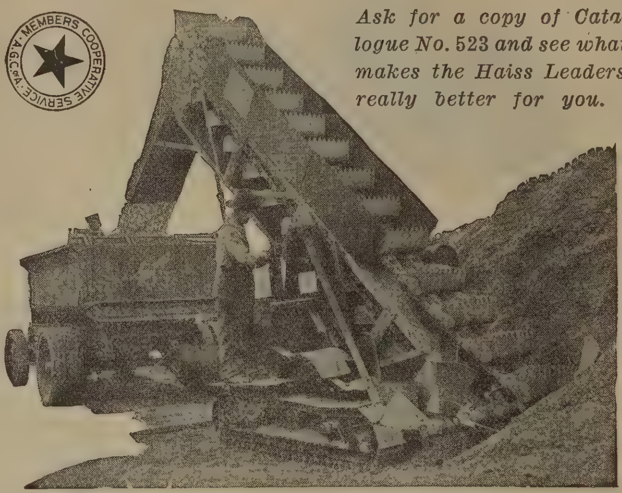
Self-Feeding Propellers, Slow Speed "Crowding" Drive

The two things that give a loading machine real capacity—and each a patented and exclusive Haiss feature.

The Self-Feeding device is the simplest and most effective means ever devised to dig material and feed to the buckets. Strong, sturdy and above resisting—yet easily repaired if damaged by accident, and without disturbing the machine. Only a boulder can bend a blade, and then a sledge will straighten the half-inch boiler plate.

The slow speed "Crowding" drive—a geared down speed of only 20 inches a minute—is just sufficient to keep the loader up against the bank as the buckets and self-feeding device dig it out. This "Crowding" motion operates simultaneously with the elevator, keeps every bucket digging a full load, and the loader delivering a full day's work.

A big-capacity loading Machine is the cheapest machine to buy and the cheapest to own. It will do anything you ask it to and has the power and stamina to stand up to its job.



Ask for a copy of Catalogue No. 523 and see what makes the Haiss Leaders really better for you.

George Haiss Manufacturing Co., Inc.
Canal Place & E. 144th St., New York, N. Y.

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3108 N. Boulevard., Richmond, Va.

Our Apologies—Please

Due to unfortunate conditions over which we had no control, we were unable to exhibit

THE LITTLEFORD PULLAR ASPHALT PRODUCING PLANT

at the Road Show. The Plant arrived too late to permit its being placed in the Coliseum.

So to the many hundreds who eagerly anticipated seeing The "PULLAR," for the first time, we offer our sincere apologies.

To those however who were disappointed and all other interested persons, we will be glad to receive requests for detailed information concerning the most remarkable contribution to Road Construction and Maintenance Equipment since the invention of the portable paving plant.

YOUR COPY IS WAITING

A GREAT ACHIEVEMENT
PRODUCING BLOWN ASPHALT WITH A PORTABLE PLANT

This beautiful brochure explaining in detail the operation and scope of The LITTLEFORD-PULLAR Asphalt Producing Plant will be gladly sent to you on request. Simply drop us a postal card.

LITTLEFORD BROS.
CINCINNATI, OHIO

E. F. CRAVEN, *"The Road Machinery Man"*
State Distributor
Greensboro, North Carolina

5 Long Months on a Contract Job and Hungry for the Next

The Long Handle Round Point

The Boyle Construction Company of Wilkes-Barre, while building a concrete road under the supervision of the Pennsylvania State Highway Department, kept a careful record of the performances of sixty Red Edge Shovels they had just purchased.

The figures as sent us by the Boyle Company will make far from dull reading for any contractor who has ever had shovel trouble:

Length of road, 4150 ft.
Width of road, 16 ft.; 18 ft.; 24 ft.
Yards of Concrete Road, 12,700.
Yards of Street Car Track
  Concrete Fill—1850—14,550 sq. yds.
Time of job: 5 months
Shovels used: Red Edge
Quantity used: 60
Number lost: None
Number stolen: None
Number sent to next job in first-class condition: 60

If you know a shovel that can put up a better fight than that—buy it. If you don't—buy Red Edge.

WYOMING
RED EDGE
SHOVELS

Chrome nickel steel—heat treated to tool steel hardness and the toughness of a steel spring. That's a Red Edge blade. XX Northern Ash tested for a 400-lb. strain. That's a Red Edge handle.

Made by THE WYOMING SHOVEL WORKS, Wyoming, Pa.

But Long Life Is the Least of Red Edge's Good Points

Eastern Pattern Hollow Back Scoop

Breakdown Scoop—Hollow Back. For transferring loose materials quickly

The extra 50 cents a Red Edge might cost you in comparison with a cheap shovel is really a saving. Because the Red Edge will outwear the cheap shovel two, perhaps three, times. But after all, you can afford to waste a little money on cheap shovels if you get any fun out of it.

Where you can't afford to waste money is in labor costs. It is right there that you need Red Edge.

Red Edge makes labor more productive. A Red Edge lifts more square yards of dirt in a given time than any ordinary shovel ***can.***

Red Edge's blade of chrome-nickel steel (heat treated) ***keeps*** its sharp edge and rigidity. You know how wasteful it is to try to work with a shovel which curls or bends or loses its shape. Red Edge ***retains*** that perfect balance which makes a heavy shovel load seem lighter.

And the XX Northern Ash handle of a Red Edge outlasts even its tough blade.

Hundreds of contractors have proven these things for themselves. Why don't you prove a few of them on ***your*** next job?

Round Point Pettebone Back Strap

Concrete Shovel. A Shovel with perfect balance and a demon for work

WYOMING
RED EDGE
SHOVELS

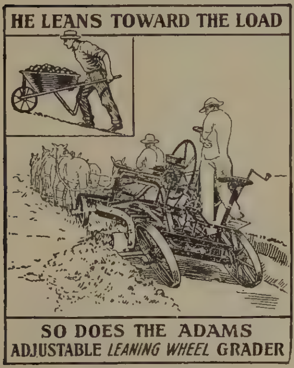
We spent 50 years learning to make one grade of shovel

Made by THE WYOMING SHOVEL WORKS, Wyoming, Pa.

Perfect back-sloped, flat-bottom ditch cut by Adams Grader with Back-Sloper Attachment

Reduce Your Grading Costs

Trade Mark

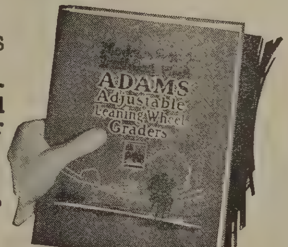


Reg. U. S. Pat. Office

YOU can build better roads and do more work per dollar or per day with an Adams Adjustable Leaning Wheel Grader than with any other. That's not an idle boast but an actual fact—proved by Highway Officials and Road Contractors all over the country, and backed by a guarantee which is the result of nearly thirty years' experience building and selling road machinery.

It's all due to the Adjustable Leaning wheels—an exclusive feature of Adams Graders. They prevent skidding, insure perfect control, increase capacity, and lessen the draft. And they enable Adams Graders to cut down side hills, fill, wash outs, build sub-grades to specifications, build perfect flatr bottomed, back-sloped ditches, handle many difficult jobs othegraders cannot do—and do it all cheaper and better than other machines or methods

Let us show you what other North Carolina highway officials and road contractors are doing and saving with Adams Graders. Mail the coupon for this catalogue.



Adams Graders are built in 6½. 7. 8. 10 and 12 ft. blade lengths.

The Adams line also includes: Scarifier-Graders. Scarifiers: Road Maintainers, Road Patrols Drags, Plows. Scrapers, Etc.

Machines and Parts in stock at Raleigh

J. C. BENJAMIN -- RALEIGH, N. C.
Office and warehouse, 733 W. Hargett Street
Distributors for J. D. ADAMS & CO., Indianapolis, Indiana.

ADAMS
Adjustable Leaning Wheel
GRADERS

J. C. BENJAMIN.
733 W. HARGETT STR,
RALEIGH, N. C.

PLEASE SEND ME THE ADAMS CATALOGUE AND EXPLAIN HOW ADAMS GRADERS REDUCE GRADING COSTS.

NAME______________________________

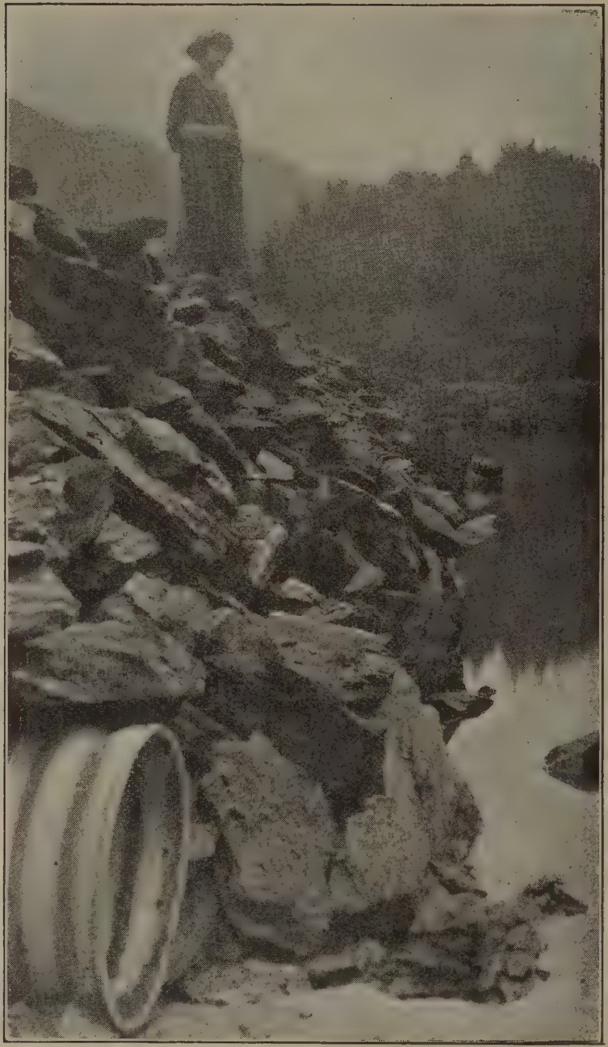
POSITION____________________________

ADDRESS____________________________

TOWN__________________ STATE__________

Report of Inspection of

A PERMANENT CULVERT



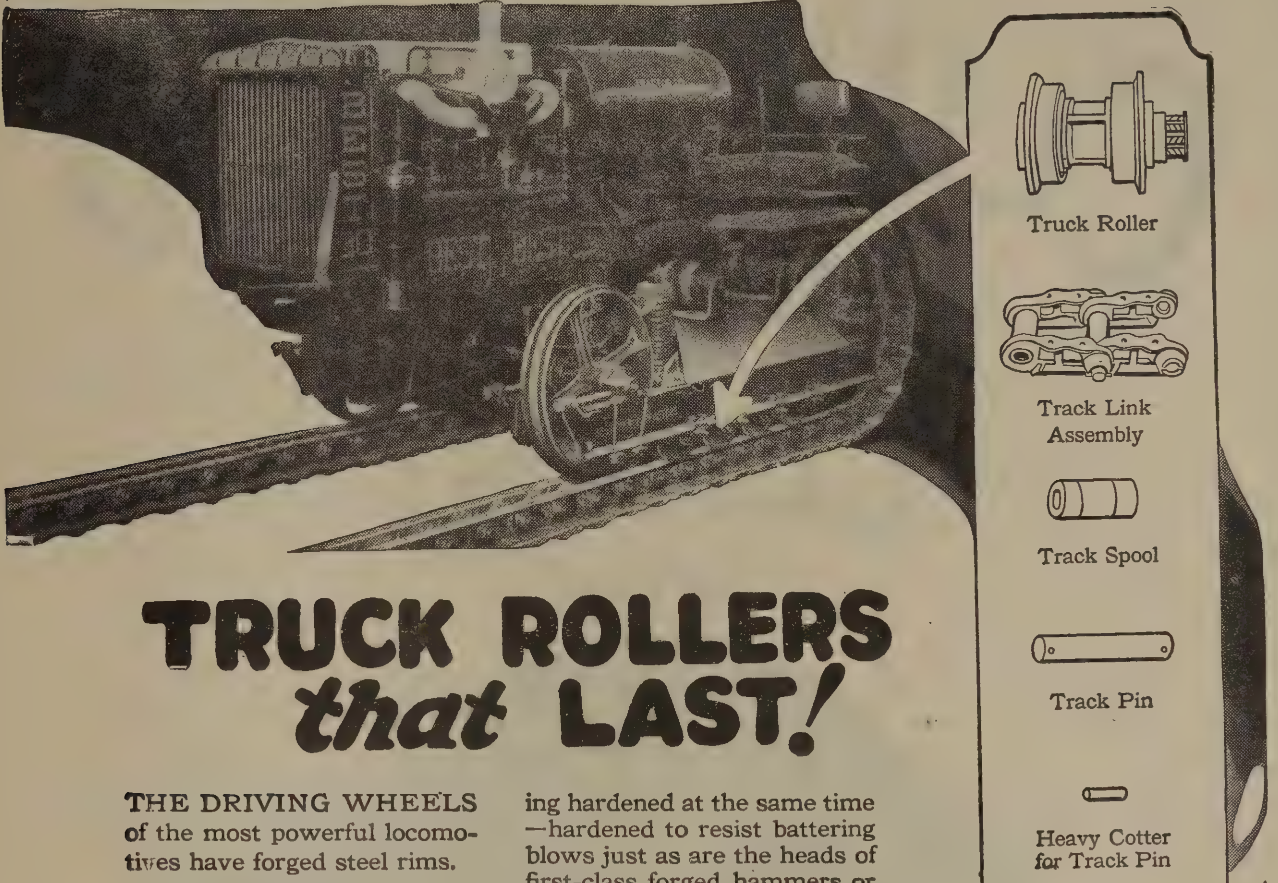
An Armco Culvert Between Lenoir and Blowing Rock, North Carolina.

:-: :-: The rugged strength and elasticity of this Armco Culvert enable it to hold up tons of rock on this mountain road above the clouds. :-: :-:

THE DIXIE CULVERT & METAL COMPANY
ATLANTA, GEORGIA

J. G. BALDWIN,
ASHEVILLE, N. C.

W. H. MCNEILL,
LAKEVIEW, N. C.



TRUCK ROLLERS *that* LAST!

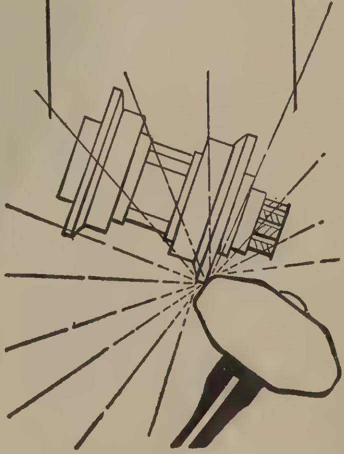
THE DRIVING WHEELS of the most powerful locomotives have forged steel rims.

The Truck Rollers of a track type tractor support the weight of the tractor and the flanges of rollers must withstand severe jars and side strains of side hill work and rough going.

On Best Tractors the flanged rims of truck rollers are drop forgings—nothing less—forged into shape under heavy steam hammers, from heated steel of special analysis. After being forged the rims are annealed, bored and reamed, then turned true on the outside tread. They are next shrunk on accurately machined hubs—being hardened at the same time—hardened to resist battering blows just as are the heads of first-class forged hammers or sledges.

The rollers, complete, are mounted on anti-friction bearings to insure easy running, bearings with seals to retain lubricant and to prevent entrance of sand and ruinous grit.

The truck rollers of Best Tractors run over tracks which are true and straight. Tracks are made from drop forged hardened links which have been accurately machined top and bottom and large hardened spools and pins at each joint contribute to the long life which may be expected from the tracks on Best Tractors.



"When Greek meets Greek." Both the sledge and the flanged roller rims are hardened drop forged steel.

E. F. CRAVEN

"The Road Machinery Man"

GREENSBORO, N. C. :-: STATE DISTRIBUTOR

1222-4

BEST TRACTORS

CLINCHFIELD
PORTLAND
CEMENT

FINE

SOUND

UNIFORM

LIGHT

CLINCHFIELD PORTLAND CEMENT CORP'N.
PORTLAND
TRADE MARK
CLINCHFIELD
KINGSPORT TENN.
CEMENT

THE ACKNOWLEDGED STANDARD OF THE SOUTH.

OFFICES AND MILLS - KINGSPORT, TENN.

NEWPORT CULVERT COMPANY

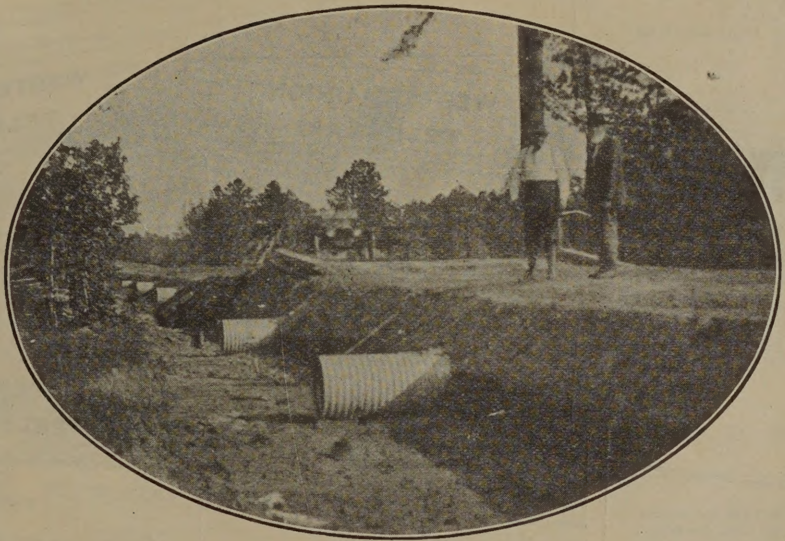
OF

NEWPORT, KENTUCKY

THE OLD RELIABLE

"GENUINE OPEN HEARTH IRON"

CULVERT



For the convenience of our
local customers we carry
a large stock in Raleigh.

J. H. SLAUGHTER

State Representative

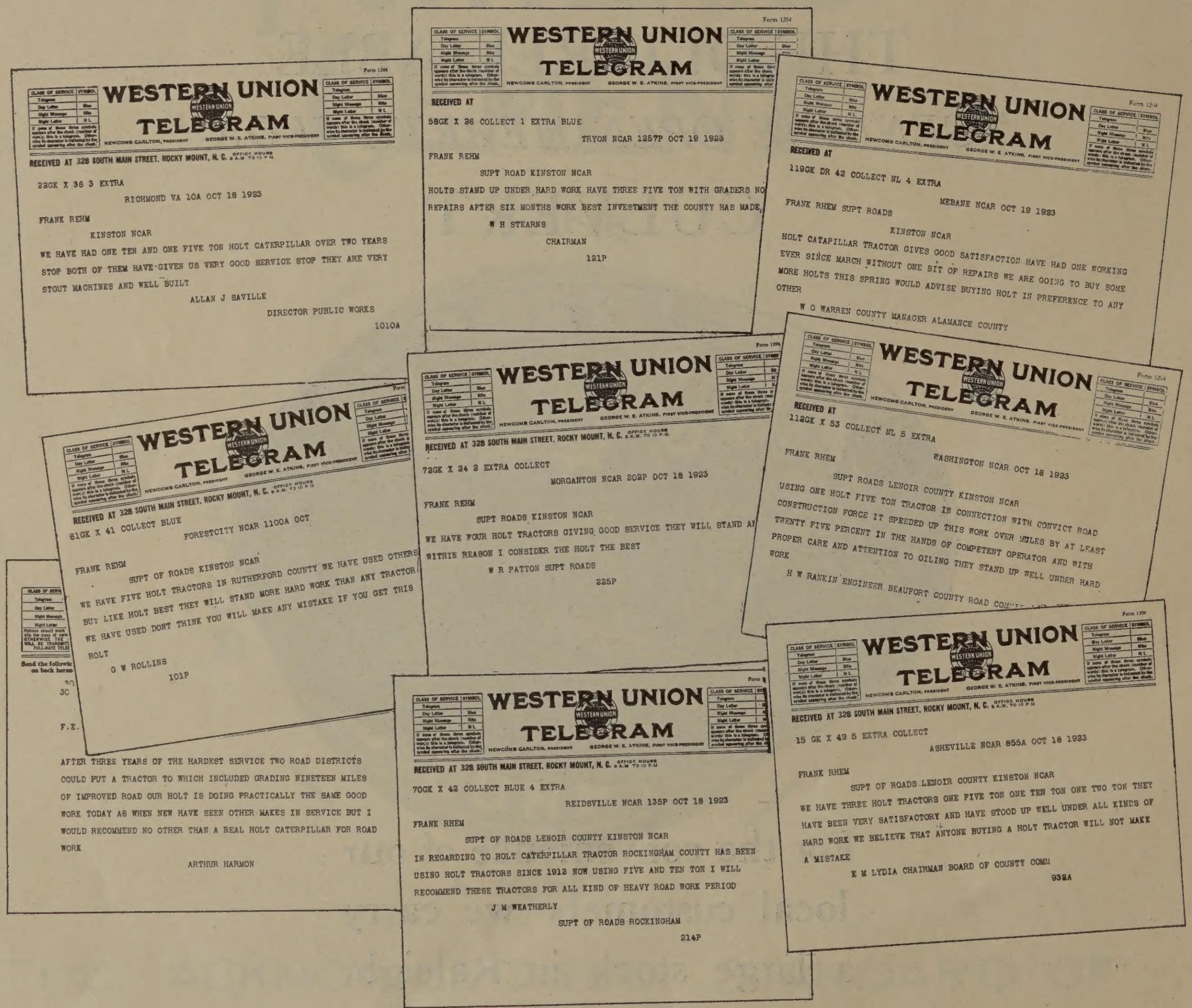
Office and Storage Yards Corner Mountford and Lenoir Streets

PHONE 2424

Tractor & Machinery Sales Co.

Distributors

RICHMOND, VIRGINIA



WESTERN UNION TELEGRAM

RECEIVED AT 328 SOUTH MAIN STREET, ROCKY MOUNT, N. C. OFFICE HOURS 8 A.M. TO 10 P.M.

32GK X 36 3 EXTRA

RICHMOND VA 10A OCT 18 1923

FRANK REHM

KINSTON NCAR

WE HAVE HAD ONE TEN AND ONE FIVE TON HOLT CATERPILLAR OVER TWO YEARS STOP BOTH OF THEM HAVE GIVEN US VERY GOOD SERVICE STOP THEY ARE VERY STOUT MACHINES AND WELL BUILT

ALLAN J SAVILLE

DIRECTOR PUBLIC WORKS

1010A

WESTERN UNION TELEGRAM

RECEIVED AT

58GK X 26 COLLECT 1 EXTRA BLUE

TRYON NCAR 1257P OCT 19 1923

FRANK REHM

SUPT ROAD KINSTON NCAR

HOLTS STAND UP UNDER HARD WORK HAVE THREE FIVE TON WITH GRADERS NO REPAIRS AFTER SIX MONTHS WORK BEST INVESTMENT THE COUNTY HAS MADE,

W H STEARNS

CHAIRMAN

121P

WESTERN UNION TELEGRAM

RECEIVED AT

119GK DR 42 COLLECT NL 4 EXTRA

MEBANE NCAR OCT 19 1923

FRANK RHEM SUPT ROADS

KINSTON NCAR

HOLT CATAPILLAR TRACTOR GIVES GOOD SATISFACTION HAVE HAD ONE WORKING EVER SINCE MARCH WITHOUT ONE BIT OF REPAIRS WE ARE GOING TO BUY SOME MORE HOLTS THIS SPRING WOULD ADVISE BUYING HOLT IN PREFERENCE TO ANY OTHER

W O WARREN COUNTY MANAGER ALAMANCE COUNTY

WESTERN UNION TELEGRAM

RECEIVED AT 328 SOUTH MAIN STREET, ROCKY MOUNT, N. C. OFFICE HOURS 8 A.M. TO 10 P.M.

61GK X 41 COLLECT BLUE

FORESTCITY NCAR 1100A OCT

FRANK REHM

SUPT OF ROADS KINSTON NCAR

WE HAVE FIVE HOLT TRACTORS IN RUTHERFORD COUNTY WE HAVE USED OTHERS BUT LIKE HOLT BEST THEY WILL STAND MORE HARD WORK THAN ANY TRACTOR WE HAVE USED DONT THINK YOU WILL MAKE ANY MISTAKE IF YOU GET THIS HOLT

G W ROLLINS

101P

Send the followi on back hereo

30

F.E.

AFTER THREE YEARS OF THE HARDEST SERVICE TWO ROAD DISTRICTS COULD PUT A TRACTOR TO WHICH INCLUDED GRADING NINETEEN MILES OF IMPROVED ROAD OUR HOLT IS DOING PRACTICALLY THE SAME GOOD WORK TODAY AS WHEN NEW HAVE SEEN OTHER MAKES IN SERVICE BUT I WOULD RECOMMEND NO OTHER THAN A REAL HOLT CATERPILLAR FOR ROAD WORK

ARTHUR HARMON

WESTERN UNION TELEGRAM

RECEIVED AT 328 SOUTH MAIN STREET, ROCKY MOUNT, N. C. OFFICE HOURS 8 A.M. TO 10 P.M.

72GK X 24 2 EXTRA COLLECT

MORGANTON NCAR 202P OCT 18 1923

FRANK REHM

SUPT ROADS KINSTON NCAR

WE HAVE FOUR HOLT TRACTORS GIVING GOOD SERVICE THEY WILL STAND A WITHIN REASON I CONSIDER THE HOLT THE BEST

W R PATTON SUPT ROADS

325P

WESTERN UNION TELEGRAM

RECEIVED AT

112GK X 53 COLLECT NL 5 EXTRA

WASHINGTON NCAR OCT 18 1923

FRANK RHEM

SUPT ROADS LENOIR COUNTY KINSTON NCAR

USING ONE HOLT FIVE TON TRACTOR IN CONNECTION WITH CONVICT ROAD CONSTRUCTION FORCE IT SPEEDED UP THIS WORK OVER MULES BY AT LEAST TWENTY FIVE PERCENT IN THE HANDS OF COMPETENT OPERATOR AND WITH PROPER CARE AND ATTENTION TO OILING THEY STAND UP WELL UNDER HARD WORK

H W RANKIN ENGINEER BEAUFORT COUNTY ROAD COM

WESTERN UNION TELEGRAM

RECEIVED AT 328 SOUTH MAIN STREET, ROCKY MOUNT, N. C. OFFICE HOURS 8 A.M. TO 10 P.M.

70GK X 42 COLLECT BLUE 4 EXTRA

REIDSVILLE NCAR 135P OCT 18 1923

FRANK RHEM

SUPT OF ROADS LENOIR COUNTY KINSTON NCAR

IN REGARDING TO HOLT CATERPILLAR TRACTOR ROCKINGHAM COUNTY HAS BEEN USING HOLT TRACTORS SINCE 1912 NOW USING FIVE AND TEN TON I WILL RECOMMEND THESE TRACTORS FOR ALL KIND OF HEAVY ROAD WORK PERIOD

J M WEATHERLY

SUPT OF ROADS ROCKINGHAM

214P

WESTERN UNION TELEGRAM

RECEIVED AT 328 SOUTH MAIN STREET, ROCKY MOUNT, N. C. OFFICE HOURS 8 A.M. TO 10 P.M.

15 GK X 49 5 EXTRA COLLECT

ASHEVILLE NCAR 855A OCT 18 1923

FRANK RHEM

SUPT OF ROADS LENOIR COUNTY KINSTON NCAR

WE HAVE THREE HOLT TRACTORS ONE FIVE TON ONE TEN TON ONE TWO TON THEY HAVE BEEN VERY SATISFACTORY AND HAVE STOOD UP WELL UNDER ALL KINDS OF HARD WORK WE BELIEVE THAT ANYONE BUYING A HOLT TRACTOR WILL NOT MAKE A MISTAKE

E M LYDIA CHAIRMAN BOARD OF COUNTY COMM

932A

The Lenoir County Commissioners made a pretty thorough investigation. They bought "Caterpillar" equipment.

There's Only One "CATERPILLAR" Holt Builds It

New Zealand Knows The Answer!

WITH about a dozen manufacturers of steam and motor rollers in England, why do her colonies come to Chicago for their rollers in increasing numbers each year?

With high speed, four cylinder motor rollers offered at lower prices, why do experienced users stick to the slow speed, single cylinder Austin Motor Roller?

Hundreds of machines like the 10-year-old veteran in one of the photographs are the best possible answer; with their good old "one lungs" running as smoothly and silently as the day they left the factory. (Yanking around a 10-ton road roller, with no spring mounting, at three miles per hour is a far different matter from propelling a light, spring-mounted, rubber-tired automobile at sixty.)

Other reasons for the constantly increasing popularity of the Austin Motor Roller are given in Catalog "G". Your copy is ready

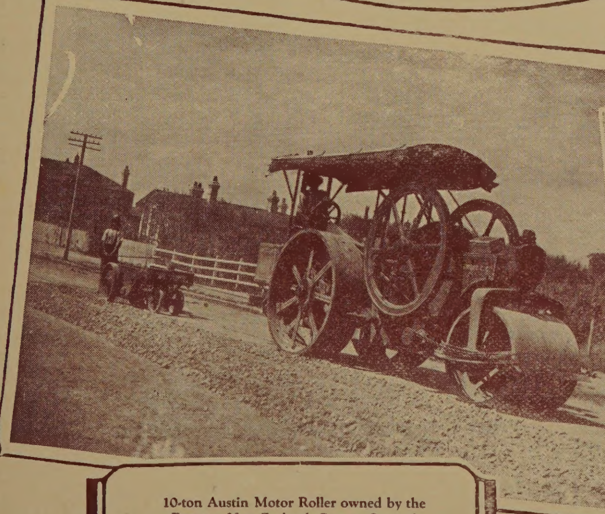
The Austin-Western Road Machinery Co.

Factories and Home Office, Chicago

Branches in all Principal Cities

Austin Motor Roller and Austin Scarifier giving a demonstration at Christchurch, New Zealand.

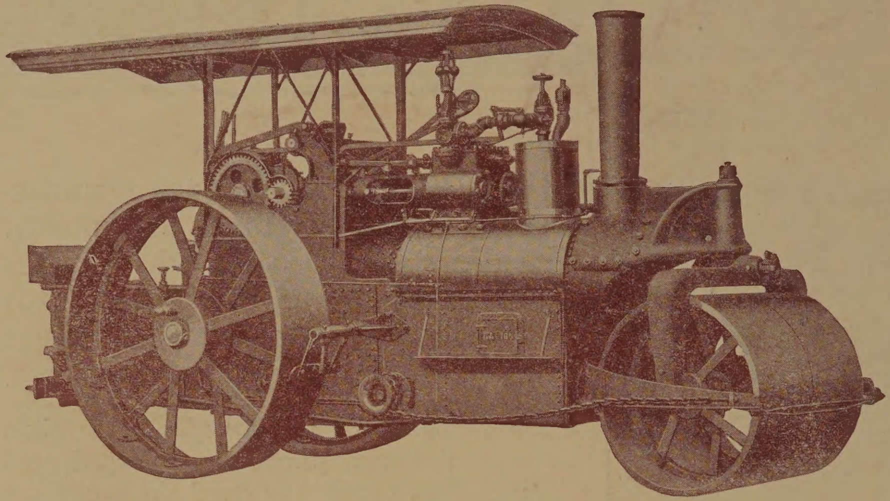
Still going strong after 10 years of active service. The Cook County, New Zealand, Council has recently added a second Austin Motor Roller to its fleet on the strength of this record.



10-ton Austin Motor Roller owned by the Egmont, New Zealand, County Council.

Austin Motor Roller belonging to the Piako, New Zealand, County Council driving a rock crusher.

Let Us Solve Your Roller Problem



Boiler of the Galion Steam Roller passes all boiler rulings, including Massachusetts code. Working pressure of 200 pounds per square inch and built to stand it.

Double cylinders, each 6″ x 9″.

Rear rolls, 72″ diameter, 20″ face.

Front rolls (two), 44″ diameter, 44″ face.

All bearings are made of phosphor-bronze.

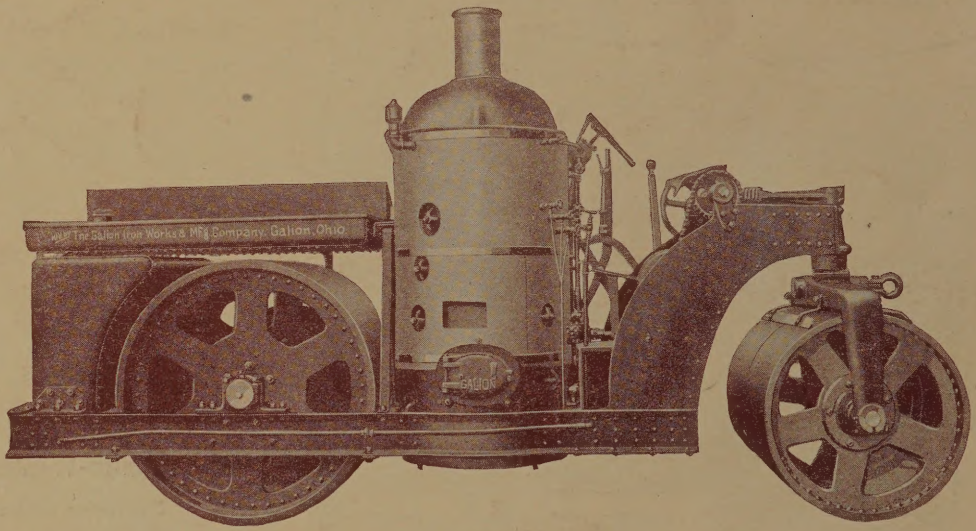
Write for Special Roller Bulletin

The Roller that SAVES Time and Money

The boiler on the Steam Tandem Rollers is of the vertical type, designed, built and inspected in accordance with all boiler codes, including Massachusetts code. Has working pressure of 200 pounds per square inch and is built to stand it. Equipped with both high and low pressure injectors.

Built in 5, 6, 7, 8, 9, and 10 ton sizes.

Write for special roller bulletin.



The Galion Line Includes

Motor Road Rollers
Steam Road Rollers
Tandem Motor Road Rollers
Road Plows
Road Drags
Rooter Plows
Fresno Scrapers
Rock Crushers
Tandem Steam Road Rollers
Crushed Stone Spreaders
Gravel Spreaders
Coal Unloaders
Road Scarifiers
Cast Iron Culverts
Road Grader Blades
Wheel Scrapers
Automatic Force Feeds for Gravel Screening Plants
Gravel Screening Plants
Corrugated Culverts
Drag or Slip Scrapers
Catch Basin Covers
Gravel Loaders
Car Unloaders
Road Graders
Road Planers
Road Maintainers
Road Scarifier-Graders

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